

NATIONAL RECOGNITION REPORT

Initial Preparation of Mathematics Education Teachers at the Secondary Level

NCATE recognition of this program is dependent on the review of the program by representatives of the National Council of Teachers of Mathematics (NCTM).

COVER PAGE

Name of institution

Arkansas State University

Date of review

MM DD YYYY

02 / 01 / 2009

This report is in response to a(n):

- Initial Review
- Revised Report
- Response to Conditions Report

Program Covered by this Review

Mathematics (BSE Degree Program)

Program Type

First Teaching License

Award or Degree Level

- Baccalaureate
- Post Baccalaureate
- Master's

PART A - RECOGNITION DECISION

SPA Decision on NCATE Recognition of the Program(s):

- Nationally recognized
- Nationally recognized with conditions
- Further development required **OR** Nationally recognized with probation [See Part G]
- Not nationally recognized

Test Results (from information supplied in Assessment #1, if applicable)

The program meets or exceeds an 80% pass rate on state licensure exams:

- Yes
- No
- Not applicable
- Not able to determine

Comment:

Ninety-six percent pass rate on Praxis II over three years (24/25 pass rate).

Summary of Strengths:

- 1) Faculty within the Department of Mathematics & Statistics are also members of the professional Education Unit.
- 2) In order to ensure that candidates benefit from a variety of and diversity in educational settings, teaching sites include schools that vary by size and diversity of student population.

PART B - STATUS OF MEETING SPA STANDARDS

Standard 1. Knowledge of Problem Solving. Candidates know, understand and apply the process of mathematical problem solving.

Indicators:

1.1 Apply and adapt a variety of appropriate strategies to solve problems.

Met	Not Met
<input type="radio"/>	<input type="radio"/>

1.2 Solve problems that arise in mathematics and those involving mathematics in other contexts

Met	Not Met
<input type="radio"/>	<input type="radio"/>

1.3 Build new mathematical knowledge through problem solving.

Met	Not Met
<input type="radio"/>	<input type="radio"/>

1.4 Monitor and reflect on the process of mathematical problem solving.

Met	Not Met
<input type="radio"/>	<input type="radio"/>

Standard 1 comments:

All indicators are either met by Praxis 0061 and/or the Geometry Technology Project.

Standard 2. Knowledge of Reasoning and Proof. Candidates reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry.

Indicators:

2.1 Recognize reasoning and proof as fundamentals aspects of mathematics.

Met	Not Met
jñ	jñ

2.2 Make and investigate mathematical conjectures

Met	Not Met
jñ	jñ

2.3 Develop and evaluate mathematical arguments and proofs.

Met	Not Met
jñ	jñ

2.4 Select and use various types of reasoning and methods of proof.

Met	Not Met
jñ	jñ

Standard 2 comments:

Course requirements (Assessment 2) are sufficient for 2.1 through 2.4.
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Standard 3. Knowledge of Mathematical Communication. Candidates communicate their mathematical thinking orally and in writing to peers, faculty and others.

Indicators:

3.1 Communicate their mathematical thinking coherently and clearly to peers, faculty, and others.

Met	Not Met
jñ	jñ

3.2 Use the language of mathematics to express ideas precisely.

Met	Not Met
jñ	jñ

3.3 Organize mathematical thinking through communication

Met	Not Met
jñ	jñ

3.4 Analyze and evaluate the mathematical thinking and strategies of others.

Met	Not Met
jñ	jñ

Standard 3 comments:

Assessments 6 and 7 address both written and oral communication but the descriptions do not provide evidence to assess whether indicator 3.4 is met. Assessment 3, Unit of Instruction, does not provide a rubric that is clearly aligned to indicators; therefore, this assessment is insufficient to determine whether individual indicators are being met.

Standard 4. Knowledge of Mathematical Connections. Candidates recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding.

Indicators:

4.1 Recognize and use connections among mathematical ideas.

Met	Not Met
jñ	jñ

4.2 Recognize and apply mathematics in contexts outside of mathematics.

Met	Not Met
jñ	jñ

4.3 Demonstrate how mathematical ideas interconnect and build on one another to produce a coherent whole.

Met	Not Met
jñ	jñ

Standard 4 comments:

Indicators 4.1 and 4.2 are met by Praxis 0061. Assessments 2, 6, 7 and 8 are sufficient to demonstrate that indicator 4.3 is addressed.

Standard 5. Knowledge of Mathematical Representation. Candidates use varied representations of mathematical ideas to support and deepen students' mathematical understanding.

Indicators:

5.1 Use representations to model and interpret physical, social, and mathematical phenomena.

Met	Not Met
jñ	jñ

5.2 Create and use representations to organize, record, and communicate mathematical ideas

Met	Not Met
jñ	jñ

5.3 Select, apply, and translate among mathematical representations to solve problems

Met	Not Met
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jñ

jñ

Standard 5 comments:

All indicators are met by Praxis 0061. Assessment 3, Unit of Study, and Assessment 7, the NCTM Portfolio Assessment, are aligned to broad standards but not specific indicators; therefore, it is difficult to show how individual indicators are addressed through these assessments.

Standard 6. Knowledge of Technology. Candidates embrace technology as an essential tool for teaching and learning mathematics.

Indicators:

6.1 Use knowledge of mathematics to select and use appropriate technological tools, such as but not limited to, spreadsheets, dynamic graphing tools, computer algebra systems, dynamic statistical packages, graphing calculators, data-collection devices, and presentation software.

Met

Not Met

jñ

jñ

Standard 6 comments:

This standard is met through the Geometry Technology Project. The other assessments showing alignment to this indicator are insufficient to demonstrate that the indicator is being addressed.

Standard 7. Dispositions. Candidates support a positive disposition toward mathematical processes and mathematical learning.

Indicators:

7.1 Attention to equity

Met

Not Met

jñ

jñ

7.2 Use of stimulating curricula

Met

Not Met

jñ

jñ

7.3 Effective teaching

Met

Not Met

jñ

jñ

7.4 Commitment to learning with understanding

Met

Not Met

jñ

jñ

7.5 Use of various assessments

Met	Not Met
jñ	jñ

7.6 Use of various teaching tools including technology

Met	Not Met
jñ	jñ

Standard 7 comments:

Assessment 4 addresses the indicators for this standard; however, the use of technology is not explicitly identified as one of teaching tools or models that the candidates may use. Assessment 5 also address the indicators including the use of technology. Assessment 7 is not aligned to individual indicators and not all students will include artifacts that will specifically address individual indicators; therefore, assessment 7 is insufficient to show that these indicators are met.

Standard 8. Knowledge of Mathematics Pedagogy. Candidates possess a deep understanding of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning.

Indicators:

8.1 Select, use, and determine suitability of the wide variety of available mathematics curricula and teaching materials for all students, including those with special needs such as the gifted, challenged and speakers of other languages.

Met	Not Met
jñ	jñ

8.2 Select and use appropriate concrete materials for learning mathematics.

Met	Not Met
jñ	jñ

8.3 Use multiple strategies, including listening to and understanding the ways students think about mathematics, to assess students' mathematical knowledge.

Met	Not Met
jñ	jñ

8.4 Plan lessons, units and courses that address appropriate learning goals, including those that address local, state, and national mathematics standards and legislative mandates.

Met	Not Met
jñ	jñ

8.5 Participate in professional mathematics organizations and uses their print and on-line resources.

Met	Not Met
jñ	jñ

8.6 Demonstrate knowledge of research results in the teaching and learning of mathematics

Met	Not Met
j _n	j _n

8.7 Use knowledge of different types of instructional strategies in planning mathematics lessons.

Met	Not Met
j _n	j _n

8.8 Demonstrate the ability to lead classes in mathematical problem solving and in developing in-depth conceptual understanding, and help students develop and test generalizations

Met	Not Met
j _n	j _n

8.9 Develop lessons that use technology's potential for building understanding of mathematical concepts and developing important mathematical ideas.

Met	Not Met
j _n	j _n

Standard 8 comments:

Some indicators are addressed through Assessment 3 though it is difficult at times to align the general competencies to the specific indicators listed for this standard.

Assessments 3 and 7 are not aligned to individual indicators making it impossible to determine if all candidates address specific indicators. For Assessment 7 not all students will include artifacts that specifically address individual indicators; therefore, assessment 7 is insufficient to show that these indicators are met.

Standard 9. Knowledge of Number and Operations. Candidates demonstrate computational proficiency, including a conceptual understanding of numbers, ways of representing number, relationships among number and number systems, and meanings of operations.

Indicators:

9.1 Analyze and explain the mathematics that underlies the procedures used for operations involving integers, rational, real and complex numbers.

Met	Not Met
j _n	j _n

9.2 Use properties involving number and operations, mental computation, and computational estimation.

Met	Not Met
j _n	j _n

9.3 Provide equivalent representations of fractions, decimals, and percents.

Met	Not Met
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jñ

jñ

9.4 Create, solve, and apply proportions.

Met

Not Met

jñ

jñ

9.5 Apply the fundamental ideas of number theory.

Met

Not Met

jñ

jñ

9.6 Makes sense of large and small number and number systems.

Met

Not Met

jñ

jñ

9.7 Compare and contrast properties of numbers and number systems.

Met

Not Met

jñ

jñ

9.8 Represent, use and apply complex numbers

Met

Not Met

jñ

jñ

9.9 Recognize matrices and vectors as systems that have some of the properties of the real number system.

Met

Not Met

jñ

jñ

9.10 Demonstrate knowledge of the historical development of number and number systems including contributions from diverse cultures.

Met

Not Met

jñ

jñ

Standard 9 comments:

Indicator 9.10 is aligned to the History of Mathematics (Assessment 2).

Standard 10. Knowledge of Different Perspectives on Algebra. Candidates emphasize relationships among quantities including functions, ways of representing mathematical relationships, and the analysis of change.

Indicators:

10.1 Analyze patterns, relations, and functions of one and two variables.

Met

Not Met

jñ jñ

10.2 Apply fundamental ideas of linear algebra.

Met Not Met

jñ jñ

10.3 Apply the major concepts of abstract algebra to justify algebraic operations and formally analyze algebraic structures.

Met Not Met

jñ jñ

10.4 Use mathematical models to represent and understand quantitative relationships.

Met Not Met

jñ jñ

10.5 Use technological tools to explore algebraic ideas and representations of information and in solving problems.

Met Not Met

jñ jñ

10.6 Demonstrate knowledge of the historical development of algebra including contributions from diverse cultures.

Met Not Met

jñ jñ

Standard 10 comments:

Assessment 1 (Praxis) addresses 10.1-10.3. Assessment 2 addresses all indicators with the exception of technology.

Standard 11. Knowledge of Geometries. Candidates use spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties.

Indicators:

11.1 Demonstrate knowledge of core concepts and principles of Euclidean and non-Euclidean geometry in two- and three-dimensions from both formal and informal perspectives.

Met Not Met

jñ jñ

11.2 Exhibit knowledge of the role of axiomatic systems and proof in geometry.

Met Not Met

jñ jñ

11.3 Analyze characteristics and relationships of geometric shapes and structures.

Met	Not Met
j ⁿ	j ⁿ

11.4 Build and manipulate representations of two- and three-dimensional objects and visual objects from different perspectives.

Met	Not Met
j ⁿ	j ⁿ

11.5 Specify locations and describe spatial relationships using coordinate geometry, vectors and other representational systems.

Met	Not Met
j ⁿ	j ⁿ

11.6 Apply transformation and use symmetry, similarity, and congruence to analyze mathematical situations.

Met	Not Met
j ⁿ	j ⁿ

11.7 Use concrete models, drawings, and dynamic geometric software to explore geometric ideas and their applications in real-world contexts.

Met	Not Met
j ⁿ	j ⁿ

11.8 Demonstrate knowledge of the historical development of Euclidean and non-Euclidean geometries including contributions from diverse cultures.

Met	Not Met
j ⁿ	j ⁿ

Standard 11 comments:

Indicators are addressed through Assessments 1 and 2. There is no specifics to see if the history of math course covers the development of geometries. There is not sufficient evidence for 11. 1 and 11.2.

Standard 12. Knowledge of Calculus. Candidates demonstrate a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in techniques and application of calculus.

Indicators:

12.1 Demonstrate a conceptual understanding of and procedural facility with basic calculus concepts.

Met	Not Met
j ⁿ	j ⁿ

12.2 Apply concepts of function, geometry, and trigonometry in solving problems involving calculus.

Met Not Met

jñ jñ

12.3 Use the concepts of calculus and mathematical modeling to represent and solve problems taken from real-world context.

Met Not Met

jñ jñ

12.4 Use technological tools to explore and represent fundamental concepts of calculus.

Met Not Met

jñ jñ

12.5 Demonstrate knowledge of the historical development of calculus including contributions from diverse cultures.

Met Not Met

jñ jñ

Standard 12 comments:

It isn't clear how indicator 12.4 is being addressed.

Standard 13. Knowledge of Discrete Mathematics. Candidates apply the fundamental ideas of discrete mathematics in the formulation and solution of problems.

Indicators:

13.1 Demonstrate knowledge of basic elements of discrete mathematics such as graph theory, recurrence relations, finite difference approaches, linear programming, and combinatorics.

Met Not Met

jñ jñ

13.2 Apply the fundamental ideas of discrete mathematics in the formulation and solution of problems arising from real-world situations.

Met Not Met

jñ jñ

13.3 Use technological tools to solve problems involving the use of discrete structures and application of algorithms.

Met Not Met

jñ jñ

13.4 Demonstrate knowledge of the historical development of discrete mathematics including contributions from diverse cultures.

Met Not Met

jñ

jñ

Standard 13 comments:

It isn't clear how indicator 13.3 is being addressed.

Standard 14. Knowledge of Data Analysis, Statistics, and Probability. Candidates demonstrate an understanding of concepts and practices related to data analysis, statistics, and probability.

Indicators:

14.1 Design investigations, collect data, and use a variety of ways to display the data and interpret data representations that may include bivariate data, conditional probability and geometric probability.

Met

Not Met

jñ

jñ

14.2 Use appropriate methods such as random sampling or random assignment of treatments to estimate population characteristics, test conjectured relationships among variables, and analyze data.

Met

Not Met

jñ

jñ

14.3 Use appropriate statistical methods and technological tools to describe shape and analyze spread and center.

Met

Not Met

jñ

jñ

14.4 Use statistical inference to draw conclusions from data.

Met

Not Met

jñ

jñ

14.5 Identify misuses of statistics and invalid conclusions from probability

Met

Not Met

jñ

jñ

14.6 Draw conclusions involving uncertainty by using hands-on and computer-based simulation for estimating probabilities and gathering data to make inferences and conclusions.

Met

Not Met

jñ

jñ

14.7 Determine and interpret confidence intervals.

Met

Not Met

jñ

jñ

14.8 Demonstrates knowledge of the historical development of probability and statistics including contributions from diverse cultures.

Met	Not Met
jñ	jñ

Standard 14 comments:

Indicator 14.1 is met through Praxis. The remaining met indicators were met through coursework as evidenced in Assessments 2. It is concerning that no description is provided for the courses.

Standard 15. Knowledge of Measurement. Candidates apply and use measurement tools.

Indicators:

15.1 Recognize the common representations and uses of measurement and choose tools and units for measuring.

Met	Not Met
jñ	jñ

15.2 Apply appropriate techniques, tools, and formulas to determine measurements and their application in a variety of contexts.

Met	Not Met
jñ	jñ

15.3 Complete error analysis through determining the reliability of the numbers obtained from measures.

Met	Not Met
jñ	jñ

15.4 Demonstrate knowledge of the historical development of measurement and measurement systems including contributions from diverse cultures.

Met	Not Met
jñ	jñ

Standard 15 comments:

Indicators 15.1 through 15.3 are met through Praxis. Assessment 2 shows alignment for indicator 15.4 but there is no course description that is specific.

Standard 16. Field-Based Experiences. Candidates complete field-based experiences in mathematics classrooms.

Indicators:

16.1 Engage in a sequence of planned opportunities prior to student teaching that includes observing and participating in both middle and secondary mathematics classrooms under the supervision of experienced and highly qualified teachers.

Met	Not Met
jñ	jñ

16.2 Experience full-time student teaching in secondary mathematics that is supervised by a highly qualified teacher and a university or college supervisor with secondary mathematics teaching experience.

Met	Not Met
jñ	jñ

16.3 Demonstrate the ability to increase students' knowledge of mathematics.

Met	Not Met
jñ	jñ

Standard 16 comments:

Assessment 5 demonstrates that indicator 16.3 is being addressed.

PART C - EVALUATION OF PROGRAM REPORT EVIDENCE

C.1. Candidates' knowledge of content

1. Assessment 1, the Praxis 00061 examination, addresses the majority of the indicators of candidates' content knowledge.

2. Assessment 2, grades and GPA's, while aligned to many of the indicators presents some difficulties in determining whether the individual indicators are being met. Brief and informative descriptions of the courses would be helpful to show how specific indicators are met. General course descriptions are often too vague. These should be added to the alignment chart in the "Course Description" column. See the Guidelines for Using Grades as an assessment for more information (on the NCATE and NCTM web sites).

C.2. Candidates' ability to understand and apply pedagogical and professional content knowledge, skills, and dispositions

Assessments 3 & 7 are inadequate assessment tools since they show alignment to broader standards instead of indicators. It isn't clear how individual indicators can be assessed through these methods. Other assessments do provide evidence of meeting some indicators.

C.3. Candidate effects on P-12 student learning

It is difficult to determine the "research" component of assessment 5. A clearer articulation between this research project and how it relate to effects on P-12 student learning should be made.

PART D - EVALUATION OF THE USE OF ASSESSMENT RESULTS

Evidence that assessment results are evaluated and applied to the improvement of candidate

performance and strengthening of the program (as discussed in Section V of the program report)

There is evidence that the Curriculum Committee within the department meets periodically to ensure that the standards are set forth and followed and that principals complete a survey regarding student interns.

PART E - AREAS FOR CONSIDERATION

Areas for consideration

Reconfiguration and more clarity are needed in assessments 2, 3, and 7. Technology use needs to be more clearly documented. Assessment 2 needs to have the course descriptions column completed so that indicators can be more correctly evaluated.

PART F - ADDITIONAL COMMENTS

F.1. Comments on Section I (Context) and other topics not covered in Parts B-E:

Assessment 7 is vague and difficult to assess. What standards and indicators are being addressed in assessment 7? It isn't clear what these portfolios would include and which specific indicators would be addressed.

Overall, the exact minimum required number of indicators (80% or 65 indicators) are met in this report. Reviewers hope that the comments included will be considered carefully even though a revised report is not required.

F.2. Concerns for possible follow-up by the Board of Examiners:

PART G - DECISIONS

Please select final decision:

- Program is nationally recognized. The program is recognized through the semester and year of the institution's next NCATE accreditation decision in 5-7 years. To retain recognition, another program report must be submitted before that review. The program will be listed as nationally recognized through the semester of the next NCATE accreditation decision on websites and/or other publications of the SPA and NCATE. The institution may designate its program as nationally recognized by NCATE, through the semester of the next NCATE accreditation decision, in its published materials. National recognition is dependent upon NCATE accreditation.

Please click "Next"

This is the end of the report. Please click "Next" to proceed.