

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

University of Delaware

Date of review

MM DD YYYY

02 / 01 / 2010

This report is in response to a(n):

- Initial Review
- Revised Report
- Response to Conditions Report

Program Covered by this Review

Secondary Mathematics Education

Program Type

Initial Teacher Licensure

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 **OR** Not nationally recognized [See Part G]

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

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

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

Comment:

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Summary of Strengths:

- | |
|---|
| 1) Continuous monitoring of the program outcomes of candidates' performance at all levels of the program
2) Scores on the Praxis II have been awarded recognition of excellence by the parent company ETS
3) Candidates' receive high ratings on the student teaching assessment, Pathwise, and demonstrate effectiveness in the classroom
4) Mathematics content courses include specific coursework in problem solving and reasoning and proof
5) Lesson Plan assessment focuses on both content and pedagogical knowledge
6) Well prepared report made it easy for reviewers to locate and interpret data |
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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
jn	jn

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

Met	Not Met
jn	jn

1.3 Build new mathematical knowledge through problem solving.

Met	Not Met
jn	jn

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

Met	Not Met
jn	jn

Standard 1 comments:

Aspects of problem solving are built into course work throughout the program, including two required courses focused only on problem solving - MATH 279 & 379.
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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:

MATH 540 serves as the foundation for candidates to develop an understanding of reasoning and proof.
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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
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jñ

jñ

Standard 3 comments:

Opportunities to demonstrate mastery of mathematical communication are encouraged and supported at all levels of the program and in MATH 210, MATH 242, MATH 243, MATH 308, and MATH 540.

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:

This standard is reinforced throughout the program in both content and pedagogical courses such as MATH 210, MATH 242, MATH 349, MATH 350, MATH 450, MATH 518, MATH 540, MATH 308, Praxis II, and the Pathwise assessment.

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
jñ	jñ

Standard 5 comments:

This standard is met through multiple assessments by MATH 210, MATH 242, MATH 243, MATH 350, MATH 450, MATH 349, MATH 518, and Praxis II.

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:

Technology is threaded throughout both the mathematics content courses and the pedagogical courses in which candidates must present lessons utilizing technology.

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:

The Pathwise assessment is comprehensive and provides a profile of the candidates which portrays them as effective teachers.
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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
jñ	jñ

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

Met	Not Met
jñ	jñ

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
jñ	jñ

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

Met	Not Met
jñ	jñ

Standard 8 comments:

This standard is met through assessment data reported from the Lesson Plan review document, the Pathwise document, and the Teacher Effectiveness document.
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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
jñ	jñ

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

Met	Not Met
jñ	jñ

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

Met	Not Met
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
j _n	j _n

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

Met	Not Met
j _n	j _n

9.7 Compare and contrast properties of numbers and number systems.

Met	Not Met
j _n	j _n

9.8 Represent, use and apply complex numbers.

Met	Not Met
j _n	j _n

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

Met	Not Met
j _n	j _n

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

Met	Not Met
j _n	j _n

Standard 9 comments:

This standard is met through mathematics content course work in MATH 210, MATH 349, MATH 243, MATH 242, MATH 308, and the Praxis II.
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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
j _n	j _n

10.2 Apply fundamental ideas of linear algebra.

Met	Not Met
j _n	j _n

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:

This standard is met through mathematics content course work in MATH 349, MATH 210, MATH 518, MATH 451, MATH 308, and the scores on the Praxis II.
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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

jñ jñ

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

Met Not Met

jñ

jñ

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

Met

Not Met

jñ

jñ

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

Met

Not Met

jñ

jñ

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

Met

Not Met

jñ

jñ

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

Met

Not Met

jñ

jñ

Standard 11 comments:

This standard is met through MATH 242, MATH 243, MATH 308, MATH 540, and the Praxis II.

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

jñ

jñ

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

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:

This standard is met through mathematics course work in MATH 350, MATH 450, MATH 308, and the Praxis II.

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:

This standard is met through mathematics course work in MATH 518, MATH 540, MATH 308, and the Praxis II.

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:

Candidates have appropriate and comprehensive placements in the classroom that provide the foundation for successful student teaching experiences.

PART C - EVALUATION OF PROGRAM REPORT EVIDENCE

C.1. Candidates' knowledge of content

Candidates in this program demonstrate mastery of the content requirements. They have received recognition of excellence on their performance on the Praxis II and 98 percent of the candidates over the past three years have passed the exam. The content GPAs also indicate a thorough knowledge of the mathematics content. Candidates' knowledge of the content is also reflected in their high scores on the Pathwise assessment used to evaluate the student teaching experience.

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

Candidates demonstrate mastery of the target objectives at acceptable or higher levels. Candidates' scores on the Lesson Plan rubric, Teacher Effectiveness assessment, and the Pathwise assessment provide evidence that candidates possess a keen sense of the interplay of mathematical content and pedagogical techniques critical to student achievement.

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

Candidates demonstrate the ability to impact student learning in a variety of ways consistent with accepted best practices and effective instructional techniques that impact student success.

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)

The program analyzes the data provided by the individual assessments continuously and implements changes when improvement is indicated. The high quality of the program is maintained through constant review and immediate action.

PART E - AREAS FOR CONSIDERATION

Areas for consideration

PART F - ADDITIONAL COMMENTS

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

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.