

NATIONAL RECOGNITION REPORT

Initial Preparation of Mathematics Education Teachers at the Secondary Level (2003 Standards)

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

Lock Haven University of Pennsylvania

Date of review

MM DD YYYY

08 / 01 / 2013

This report is in response to a(n):

- Initial Review
- Revised Report
- Response to Conditions Report

Program Covered by this Review

Secondary Mathematics

Grade Level⁽¹⁾

7-12

(1) e.g. Early Childhood; Elementary K-6

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 **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:

- Yes
 No
 Not applicable
 Not able to determine

Comments, if necessary, concerning Test Results:

Summary of Strengths:

Field Experience structure is excellent so that candidates split time between middle grades and secondary grades.

The data reported are clear and updated regularly. The analysis of the data and record of program improvements is strong; data are being studied and a cycle of continuous improvement is evident. While some rubrics are rather generic, others are mathematics specific, especially Assessments 2, 3, and 6.

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

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

Met Not Met

1.3 Build new mathematical knowledge through problem solving.

Met Not Met

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

Met Not Met

Standard 1 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



2.2 Make and investigate mathematical conjectures

Met



Not Met



2.3 Develop and evaluate mathematical arguments and proofs.

Met



Not Met



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

Met



Not Met



Standard 2 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



3.2 Use the language of mathematics to express ideas precisely.

Met



Not Met



3.3 Organize mathematical thinking through communication

Met



Not Met



Met



Not Met



Standard 3 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



4.2 Recognize and apply mathematics in contexts outside of mathematics.

Met



Not Met



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

Met



Not Met



Standard 4 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



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

Met



Not Met



All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



Standard 6 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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

Indicators:

7.1 Attention to equity

Met



Not Met



7.2 Use of stimulating curricula

Met



Not Met



7.3 Effective teaching

Met



Not Met



7.4 Commitment to learning with understanding

Met



Not Met



7.5 Use of various assessments

Met



Not Met



7.6 Use of various teaching tools including technology

Met

Not Met



Standard 7 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



8.2 Select and use appropriate concrete materials for learning mathematics.

Met



Not Met



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

Met



Not Met



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



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



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



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

Met



Not Met



Standard 8 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



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

Met



Not Met



9.4 Create, solve, and apply proportions.

Met



Not Met



9.5 Apply the fundamental ideas of number theory.

Met



Not Met



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

Met



Not Met



9.7 Compare and contrast properties of numbers and number systems.

Met



Not Met



Met



Not Met



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

Met



Not Met



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

Met



Not Met



Standard 9 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



10.2 Apply fundamental ideas of linear algebra.

Met



Not Met



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

Met



Not Met



10.4 Use mathematical models to represent and understand quantitative relationships.

Met



Not Met



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

Met



Not Met



10.6 Demonstrate knowledge of the historical development of algebra including contributions

from diverse cultures.

Met



Not Met



Standard 10 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



11.3 Analyze characteristics and relationships of geometric shapes and structures.

Met



Not Met



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



geometries including contributions from diverse cultures.

Met



Not Met



Standard 11 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



Standard 12 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



Standard 13 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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



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

Met



Not Met



14.4 Use statistical inference to draw conclusions from data.

Met



Not Met



14.5 Identify misuses of statistics and invalid conclusions from probability

Met



Not Met



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



14.7 Determine and interpret confidence intervals.

Met



Not Met



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

Met



Not Met



Standard 14 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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

Met



Not Met



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

Met



Not Met



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

Met



Not Met



Standard 15 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

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



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



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

Met



Not Met



Standard 16 comments:

All indicators in this standard were met through the July 15, 2008 recognition report and current support is evident.

PART C - EVALUATION OF PROGRAM REPORT EVIDENCE

C.1. Candidates' knowledge of content

Strong evidence has been presented and documented showing candidates' exemplary preparation in content. Evidence presented included performance on the state exam and mathematics course grades. Subscores from the Praxis II were carefully analyzed and the 3 years of GPA data presented (Assessment 2) give a course-by-course analysis as well as an overall picture of strong performance by secondary mathematics candidates.

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

The program offers strong preparation and experiences that support development of theory-based pedagogy, high standards of professionalism, and disposition. In particular, providing courses in special education and longer field experience hours working with diverse student populations have strengthened the program. Candidates have early and frequent opportunities to be in the field as they are taking

relevant coursework. Field experiences are structured to scaffold the candidates' demonstration of pedagogical and professional content knowledge, skills, and dispositions.

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

Three years of data are presented for Assessments 4, 5, and 6 and offer strong evidence that teacher candidates have a positive impact on student learning. The student work sample shows varying levels of performance on different components, and faculty have studied and modified the TWS to enhance candidate performance.

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 meticulous nature of the data reported appears to provide good insight on the program and the level of serious responsibility assumed by the faculty and program compiler. Section V highlights analysis of every assessment, with variations in performance from candidate to candidate and from year to year carefully laid out and documented. Candidates are being successful on all indicators and NCTM standards.

Faculty and other leaders in the secondary program regularly meet to analyze data from different assessments and to make further changes for improvement. For example, the mathematics faculty found that their candidates have the lowest grades in Number Theory and Modern Algebra; on the Praxis II, the candidates performed lowest on Algebra/Number Theory and Matrix Algebra/Discrete Mathematics. Nevertheless, candidates scores were still higher than the state average in these content areas. In addition, the faculty has determined, through data collection, that infusing case studies in the methods course has helped candidate improve their performance in Assessment 5 (Teacher Work Sample).

PART E - AREAS FOR CONSIDERATION

Areas for consideration

Faculty members include only one mathematics education specialist for 63 candidates with 13 program completers for the current academic year.

PART F - ADDITIONAL COMMENTS

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

This program has consistently demonstrated that a high quality program can be sustained through the collaboration of all partners and offering of strong courses both in content and pedagogy.

The program report is well written, especially Section V. The number of program completers every year is commendable considering it is a relatively small institution with 5,000 students.

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

PART G - DECISIONS

- ① **National Recognition.** 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 mid-cycle (2 years in advance for a 5-year cycle and 3 years in advance for a 7-year cycle) before the next scheduled accreditation visit.** 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 note that once a program has been nationally recognized, it may not submit another report addressing any unmet standards or other concerns cited in the recognition report.*

Please click "Next"

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