

**STONY BROOK UNIVERSITY-PROFESSIONAL EDUCATION PROGRAM
MATHEMATICS TEACHER EDUCATION PROGRAM
Teacher Candidate Disciplinary Standards Evaluation Form**

Teacher Candidate: _____ USBID: _____

Cooperating Teacher or
University Instructor: _____

___ Methods I ___ Methods II Student Teaching Placement ___7-9 ___10-12

DIRECTIONS:

The National Council of Teachers of Mathematics (NCTM) requires all accredited education programs to provide performance evidence showing how well teacher candidates can plan and deliver instruction aligned with the sixteen (16) NCTM Program Standards. This form is our basic means for gathering this information.

Stony Brook instructors use this form to evaluate lesson and unit planning in the methods courses, and it is also used to assess the classroom performance of our student teachers.

We ask that all cooperating teachers complete this form for their student teachers at the end of each placement. Feedback from cooperating teachers is especially important for the continued development of the student teacher since they are in the best position to assess the ability of student teachers to meet the various standards in an authentic classroom setting. This form also provides the Mathematics Education Program with useful information on the strengths and weaknesses of our program.

FOR COOPERATING TEACHERS

On the following pages, please check the box that best reflects the ability of the teacher candidate to plan and deliver instruction pertaining to the individual standards. Please note that the Indicators for the Content Standards (Standards 9 – 15) for Middle Level and Secondary Mathematics Teachers vary slightly. **Student teacher performance should be assessed in relation to standards expected of beginning teachers. We strongly encourage the use of narrative comments to elaborate on candidate strengths and weaknesses in the individual standards.**

1. Does not meet standards
2. Minimally meets standards
3. Meets standards
4. Exceeds standards

Process Standards (Standards 1-7)

The process standards are based on the belief that mathematics must be approached as a unified whole. Its concepts, procedures, and intellectual processes are so interrelated that, in a significant sense, its “whole is greater than the sum of the parts.” This approach would best be addressed by involvement of the mathematics content, mathematics education, education, and field experience faculty working together in developing the candidates’ experiences.

Likewise, the response to the disposition standard will require total faculty input. This standard addresses the candidates’ nature and temperament relative to being a mathematician, an instructor, a facilitator of learning, a planner of lessons, a member of a professional community, and a communicator with learners and their families.

Standard 1: Knowledge of Mathematical 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.
- 1.2 Solve problems that arise in mathematics and those involving mathematics in other contexts.
- 1.3 Build new mathematical knowledge through problem solving.
- 1.4 Monitor and reflect on the process of mathematical problem solving.

Evidence in candidate’s planning & teaching: 10 20 30 40

Comments:

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 fundamental aspects of mathematics.
- 2.2 Make and investigate mathematical conjectures.
- 2.3 Develop and evaluate mathematical arguments and proofs.
- 2.4 Select and use various types of reasoning and methods of proof.

Evidence in candidate’s planning & teaching: 10 20 30 40

Comments:

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.

3.2 Use the language of mathematics to express ideas precisely.

3.3 Organize mathematical thinking through communication.

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

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.

4.2 Recognize and apply mathematics in contexts outside of mathematics.

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

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.

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

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Standard 6: Knowledge of Technology

Candidates embrace technology as an essential tool for teaching and learning mathematics.

Indicator

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.

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Standard 7: Dispositions

Candidates support a positive disposition toward mathematical processes and mathematical learning.

Indicators

7.1 Attention to equity

7.2 Use of stimulating curricula

7.3 Effective teaching

7.4 Commitment to learning with understanding

7.5 Use of various assessments

Use of various teaching tools including technology

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Pedagogy (Standard 8)

In addition to knowing students as learners, mathematics teacher candidates should develop knowledge of and ability to use and evaluate instructional strategies and classroom organizational models, ways to represent mathematical concepts and procedures, instructional materials and resources, ways to promote discourse, and means of assessing student understanding. This section on pedagogy is to address this knowledge and skill.

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 Selects, uses, and determines 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.
- 8.2 Selects and uses appropriate concrete materials for learning mathematics.
- 8.3 Uses multiple strategies, including listening to and understanding the ways students think about mathematics, to assess students' mathematical knowledge.
- 8.4 Plans lessons, units and courses that address appropriate learning goals, including those that address local, state, and national mathematics standards and legislative mandates.
- 8.5 Participates in professional mathematics organizations and uses their print and on-line resources.
- 8.6 Demonstrates knowledge of research results in the teaching and learning of mathematics.
- 8.7 Uses knowledge of different types of instructional strategies in planning mathematics lessons.
- 8.8 Demonstrates the ability to lead classes in mathematical problem solving and in developing in-depth conceptual understanding, and to help students develop and test generalizations.
- 8.9 Develop lessons that use technology's potential for building understanding of mathematical concepts and developing important mathematical ideas.

Evidence in candidate's planning & teaching: 1O 2O 3O 4O

Comments:

Content (Standards 9-15)

Candidates' comfort with, and confidence in, their knowledge of mathematics affects both what they teach and how they teach it. Knowing mathematics includes understanding specific concepts and procedures as well as the process of doing mathematics. That knowledge is the subject of the following standards. **Note that indicators that are underlined apply to secondary level and those in [brackets] apply to middle school level. Indicators that are neither underlined or in brackets apply to both levels.**

Standard 9: Knowledge of Number and Operation

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 [Develop] the mathematics that underlies the procedures used for operations involving integers, rational, real, and complex [whole numbers, integers, and rational] numbers.
- 9.2 Use properties involving number and operations, mental computation, and computational estimation.
- 9.3 Provide equivalent representations of fractions, decimals, and percents.
- 9.4 Create, solve, and apply proportions.
- 9.5 Apply the fundamental ideas of number theory.
- 9.6 Make sense of large and small numbers and use scientific notation.
- 9.7 Compare and contrast properties of numbers and number systems. [Analyze and explain the distinctions among whole numbers, integers, rational numbers, and real numbers and whether or not the field axioms hold.]
- 9.8 Represent, use, and apply complex numbers.
- 9.9 Recognize matrices and vectors as systems that have some of the properties of the real number system.
- 9.10 Demonstrate knowledge of the historical development of number and number systems including contributions from diverse cultures.

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

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 [Explore, analyze, and represent] patterns, relations, and functions of one and two variables.
- 10.2 Apply fundamental ideas of linear algebra. [Represent and analyze mathematical structures.]
- 10.3 Apply the major concepts of abstract algebra to justify algebraic operations and formally analyze algebraic structures.

- 10.4 Use mathematical models to represent and understand quantitative relationships.
 10.5 Use technological tools to explore algebraic ideas and representations of information and in solving problems. [Analyze change in various contexts.]
 10.6 Demonstrate knowledge of the historical development of algebra including contributions from diverse cultures.

Evidence in candidate's planning & teaching: 1○ 2○ 3○ 4○
Comments:

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 [geometry] and non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.
 11.2 Exhibit knowledge of [informal proof] the role of axiomatic systems and proofs in geometry.
 11.3 Analyze characteristics and relationships of geometric shapes and structures.
 11.4 Build and manipulate representations of two- and three- dimensional objects and visualize objects from different perspectives.
 11.5 Specify locations and describe spatial relationships using coordinate geometry, vectors, and other representational systems. [Analyze properties and relationships of geometric shapes and structures.]
 11.6 Apply transformations and use symmetry, similarity, and congruence to analyze mathematical situations.
 11.7 Use concrete models, drawings, and dynamic geometric software to explore geometric ideas and their applications in real-world contexts.
 11.8 Demonstrate knowledge of the historical development of Euclidean and non-Euclidean geometries including contributions from diverse cultures.

Evidence in candidate's planning & teaching: 1○ 2○ 3○ 4○
Comments:

Standard 12: Knowledge of Calculus

Candidates demonstrate a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in the techniques and application of the calculus.

Indicators

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

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

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

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

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

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, [finite graphs, trees,] recurrence relations, finite difference approaches, linear programming, and combinatorics.

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

13.3 Use technological tools to solve problems involving the use of discrete structures and the application of algorithms [apply the fundamental concepts of discrete mathematics].

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Standard 14: Knowledge of Data Analysis, Statistics, and Probability

Candidates demonstrate an understanding of concepts and practices related to data analysis, statistics, and probability.

Note different sets of indicators for secondary and middle school levels.

Middle School Indicators

14.1 Design investigations, collect data through random sampling or random assignment to treatments, and use a variety of ways to display the data and interpret data representations.

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

14.3 Identify misuses of statistics and invalid conclusions from probability.

14.4 Use appropriate statistical methods and technological tools to analyze data and describe shape, spread, and center.

14.5 Investigate, interpret, and construct representations for conditional probability, geometric probability, and for bivariate data.

14.6 Demonstrate knowledge of the historical development of probability and statistics including contributions from diverse cultures.

Secondary Indicators

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

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.

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

14.4 Use statistical inference to draw conclusions from data.

14.5 Identify misuses of statistics and invalid conclusions from probability.

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.

14.7 Determine and interpret confidence intervals.

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Standard 15: Knowledge of Measurement

Candidates apply and use measurement concepts and tools.

Indicators

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

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

15.3 [Employ estimation as a way of understanding measurement units and processes.]

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

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Field-Based Experiences (Standard 16)

The development of mathematics teacher candidates should include opportunities to examine the nature of mathematics, how it should be taught and how students learn mathematics; observe and analyze a range of approaches to mathematics teaching and learning, focusing on the tasks, discourse, environment and assessment; and work with a diverse range of students individually, in small groups, and in large class settings.

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.

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

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

Evidence in candidate's planning & teaching: 10 20 30 40
Comments:

Rubric for the Teacher Candidate NCTM Standards Evaluation Form

INDICATORS	RATING			
	Does not meet standards (level 1)	Minimally meets standards (level 2)	Meets standards (level 3)	Exceeds standards (level 4)
Knowledge	Demonstrates limited knowledge of content and pedagogy AND exhibits difficulties in its application AND fails to use this knowledge to facilitate construction of new mathematical knowledge for her students AND fails to reflect on the processes in which she is engaged.	Demonstrates some knowledge of content and pedagogy AND exhibits limited use in its application AND sometimes is able to use this knowledge to facilitate construction of new mathematical knowledge for her students AND sometimes reflects on the process in which she is engaged.	Demonstrates consistent knowledge of content and pedagogy AND exhibits consistent use in its application AND uses this knowledge to facilitate construction of new mathematical knowledge for her students AND reflects on the process in which she is engaged.	Demonstrates exemplary knowledge of content and pedagogy AND exhibits exemplary use in its application AND uses this knowledge to facilitate construction of new mathematical knowledge for her students in an exemplary way AND reflects deeply on the process in which she is engaged.
Professional dispositions and behaviors	Demonstrates little or no awareness of or responsibility to the values and commitments of professionalism in the teaching of mathematics	Demonstrates some awareness of or responsibility to the values and commitments of professionalism in the teaching of mathematics	Demonstrates consistent awareness of or responsibility to the values and commitments of professionalism in the teaching of mathematics	Demonstrates exemplary awareness of and responsibility to the values and commitments of professionalism in the teaching of mathematics
Written and oral communication	Demonstrates consistent inability to communicate mathematical ideas in both oral and written contexts.	Demonstrates minimal ability to communicate mathematical ideas in both oral and written contexts.	Demonstrates consistent ability to communicate mathematical ideas in both oral and written contexts.	Demonstrates exemplary ability to communicate mathematical ideas in both oral and written contexts.