

*George Mason University*  
*College of Education and Human*  
*Development*  
*Secondary Education Program*  
**EDCI 672: Advanced Methods of**  
**Teaching Mathematics in the Secondary**  
**School**



Promoting Learning & Development Across the Lifespan

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*Mathematics classrooms are more likely to be places in which mathematical proficiency develops when they are communities of learners and not collections of isolated individuals.*  
*(Kilpatrick, Swafford, and Findell, 2001)*

*All students should have access to an excellent and equitable mathematics program that provides solid support for their learning and is responsive to their prior knowledge, intellectual strengths, and personal interests.*

*Assessment should not merely be done to students; rather, it should also be done for students.*  
*(NCTM, 2000)*

**Purpose of the Course**

In *Teaching Mathematics in the Secondary School* course you thought about what it means to *understand* mathematics, were introduced to learning theories, became familiar with standards documents, and learned about characteristics of mathematics instruction that fosters deep understanding of and proficiency in working with mathematics. As a culminating event, you had the opportunity to apply all that you had learned toward the design of a unit plan.

In this course, *Advanced Methods of Teaching Mathematics in the Secondary School*, you will have the opportunity to learn more about four aspects of mathematics teaching: managing classroom discourse, differentiation, assessment, and the responsibility of teachers in today's schools. As indicated by the quotes listed above, you will explore these aspects of mathematics teaching while keeping a focus on student thinking and learning. Regardless of whether a teacher is engaging the class, differentiating instruction, or conducting an assessment, the teacher must focus on the development of student thinking about mathematics. This will help you as you embark upon Internship and your first teaching position! ☺

**Course Description as provided in the Course Catalog**

This course emphasizes developing different styles of teaching and covers curricula, current issues, and research literature in secondary school mathematics. School-based field experience required.

**Pre-requisites:**

EDCI 372 (UG) or EDCI 572

**Objectives**

Success in this course is measured by the degree to which you are able to:

- demonstrate an ability to critique classroom discourse and the role of the teacher in facilitating that discourse through reference to findings from research on student learning (NCTM SPA Standard 3; NCTM SPA Indicators 7.3, 7.4, 8.6; CEHD Core Values of Collaboration and Research-Based Practice)
- demonstrate an ability to plan and a mathematics lesson that fosters deep understanding of mathematics content for *all* students (NCTM SPA Indicators 7.1, 7.2, 7.3, 7.4, 8.1, 8.4, 8.6, 8.7 and 8.8; CEHD Cores Values of Innovation, Research-Based Practice and Social Justice)
- plan a mathematics lesson that includes elements of differentiation, assessment, and technology, is problem-based, requires students to engaging in sense making, and engages students in mathematical communication while adhering to state and national standards (NCTM SPA Standards 1, 2, 3, 6, 7, and 8; CEHD Core Values of Innovation, Research-Based Practice, and Social Justice)
- develop assessments that give a teacher insight into student thinking about mathematics content (NCTM SPA Indicators 7.5 and 8.3)

**Plan for the Course**

We will address the objectives as we progress through the course, which is organized into four sections:

**I. Managing Classroom Discourse**

In this part of the course you will critique and learn more about teacher decisions in managing whole-class mathematical discussions. You will learn more about questioning and will consider appropriate times to ask particular questions. Then, later in the course, you will have the opportunity to practice managing a conversation when you teach a full lesson to the class.

**II. Assessment**

In this final section of the course you will consider the role of assessment in a mathematics classroom and will learn more about ways that teachers might gain insight into student thinking about mathematics.

**III. Differentiation**

In this final section of the course, you will become familiar with strategies for differentiating mathematics instruction. By focusing on student thinking, you will learn how to meet student needs while holding them to high standards.

**IV. The Responsibility of the Teacher in Today's Schools**

In this final section of the course you will consider the role of a *mathematics* teacher in today's world. You will consider your responsibility to the diverse group of students you will be teaching and to the surrounding community.

## Textbooks and Materials

Daily access to the following materials is required:

Brahier, D.J. (2009). *Teaching secondary and middle school mathematics* (3<sup>rd</sup> edition). Boston: Pearson Education Inc.

Brahier, D. J. (2001). *Assessment in middle and high school mathematics: A teacher's guide*. New York: Eye on Education.

Dodge, J. (2005). *Differentiation in action*. New York, NY: Scholastic.

Additional readings as assigned.

## Course Expectations/Assignments

The following assignments will help you (and me) to gauge your development throughout the course:

Assessment	Due Date	Percentage of Grade
Participation and Preparation		15%
Micro-Teaching & Reflection		25%
Field Work Assignment		15%
Unit Plan Assignment		25%
Assessment Assignment		20%

*Every student registered EDCI 472/672: Advanced Methods of Teaching Mathematics in the Secondary School, a course with a required performance-based assessment, is required to submit this assessment, Unit Plans and Assessment Plans, to TaskStream. Evaluation of your performance-based assessments will also be provided using TaskStream. Failure to submit the assessment to TaskStream will result in the course grade reported as Incomplete(IN). Unless this grade is changed upon completion of the required TaskStream submission, the IN will convert to an F nine weeks into the following semester.*

### *Participation and Preparation*

The participation of each class member is vitally important. If you do not come prepared to discuss the readings, to share you work on a given assignment, and to participate in the activities of the day the entire class will suffer. You **must** commit to be coming to every class on time, being prepared for the evening's activities, and being ready to participate. After the first absence your grade will begin to suffer. You can expect that, in addition to work on the larger projects outlined below, there will be weekly readings and assignments that will fall into this category. If, however, there is an emergency and you cannot make it to class, you **must email me ahead of time** and submit all assignments electronically before the end of class. Absences will result in a lower participation grade.

### *Unit Plan and Presentation - a required performance-based assessment*

Throughout this semester, you will explore many issues related to the teaching and learning of mathematics. In this culminating assignment, you will have the opportunity to use the knowledge, skills, and understandings you've gained in this and the previous semester in the creation of a complete unit of study. Within this unit plan, you will be asked to design lessons that pay attention to the use of technology, the development of student understanding of mathematics content, various standards documents, assessment of student understanding, and ways to differentiate instruction for diverse groups of learners. *Note the number of lessons required on the description and specifications for the unit plan for graduate and undergraduate levels.* After submission of the unit plan, you will present your plan to your peers so that the entire class can begin to create a collection of teaching ideas for various content areas within secondary mathematics. **[The requirement for this assignment**

**differs for graduate and undergraduate students] You must pass this assignment to continue in the program.**

*Assessment Assignment - a required performance-based assessment*

In this assessment, you will apply what you learned about assessment to your unit plan. Building on what you learned, you will further develop your assessment plan for the unit and, in so doing, develop two assessment instruments and corresponding grading rubrics. One assessment will be a quiz assessing the goals and objectives from one of the lessons in your unit plan. Another assessment will be an alternative form of assessment used to assess the goals and objectives of the unit.

*Micro-Teaching Assignment*

In this assignment, you will apply all that you learned about planning and orchestrating classroom discourse to the development, implementation, and reflection upon a lesson surrounding a mathematics concept covered in secondary mathematics classrooms. The lesson topic will be assigned by the instructor. The implementation of the lesson will be video-recorded so as to facilitate the reflection process. This process is valuable to you as you teach and reflect on your teaching of a lesson.

*Field Work Assignment*

You will complete 15 hours of field work and keep a log of these hours for submission at the end of the semester. During this time, you will remain with one teacher and slowly begin to interact with students. By the end of the experience you will have taught a whole, or part of a whole, lesson. You will submit the lesson and reflect upon its effectiveness. This assignment provides you with an excellent opportunity to work with real students as you prepare to become a teacher.

**Communication**

You must regularly check your GMU email and Blackboard: <https://courses.gmu.edu>.

**Evaluation**

Final course grades will be assigned based upon weighted percentages as indicated by the Course Expectations.

A	93-100%
A-	90-92%
B+	88-89%
B	80-87%
C	70-79%
F	Below 70%

**Student Expectations (as described by the College of Education and Human Development)**

- Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/honor-code/>].
- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See <http://ods.gmu.edu/>].
- Students must follow the university policy for Responsible Use of Computing [See <http://universitypolicy.gmu.edu/1301gen.html>].
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

- Students are expected to exhibit professional behaviors and dispositions at all times.

### **Campus Resources**

- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See <http://caps.gmu.edu/>].
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See <http://writingcenter.gmu.edu/>].
- For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See <http://gse.gmu.edu/>].

### **College Expectations**

The College expects students to exhibit the following Professional Dispositions:

#### *Commitment to the profession*

Promoting exemplary practice  
Excellence in teaching and learning  
Advancing the profession  
Engagement in partnerships

#### *Commitment to honoring professional ethical standards*

Fairness  
Honesty  
Integrity  
Trustworthiness  
Confidentiality  
Respect for colleagues and students

#### *Commitment to key elements of professional practice*

Belief that all individuals have the potential for growth and learning  
Persistence in helping individuals succeed  
High standards  
Safe and supportive learning environments  
Systematic planning  
Intrinsic motivation  
Reciprocal, active learning  
Continuous, integrated assessment  
Critical thinking  
Thoughtful, responsive listening  
Active, supportive interactions  
Technology-supported learning  
Research-based practice  
Respect for diverse talents, abilities, and perspectives  
Authentic and relevant learning

#### *Commitment to being a member of a learning community*

Professional dialogue  
Self-improvement  
Collective improvement  
Reflective practice  
Responsibility  
Flexibility  
Collaboration  
Continuous, lifelong learning

#### *Commitment to democratic values and social justice*

Understanding systemic issues that prevent full participation  
Awareness of practices that sustain unequal treatment or unequal voice  
Advocate for practices that promote equity and access  
Respects the opinion and dignity of others  
Sensitive to community and cultural norms  
Appreciates and integrates multiple perspectives

**Tentative Schedule**

The dates are subject to change dependent on the progress of the course. Due dates for major assignments will not be moved to an earlier date, only a later date if necessary.

Date	Topic	Text	Major Assignment Due
<b>Class 1 Jan 23</b>	The Big Picture: Course Goals and Unit Planning	Brahier (2009): Chapter 6 pp. 136-141	
<b>Class 2 Jan 30</b>	Managing Discourse	Sign Up for a reading: HO: Discourse That Promotes Conceptual Understanding  HO: "It's Hard Getting Kids to Talk About Math": Helping New Teachers Improve Mathematical Discourse  Curriculum Vision and Coherence: Adapting Curriculum ...  The Marble Line ALL READ	BRING TO CLASS: Idea for Unit Plan Concept Map
<b>Class 3 Feb 6</b>	Questioning and Reflection	<u>Teacher Experts</u> - Sign up for a reading HO: The Importance, Nature and Impact of Teacher Questions HO: Questioning the Questions HO: Questioning Our Patterns of Questioning  HO: Student Generated Questions ----- <u>Teacher Experts</u> - Sign up for a reading HO: Describing levels and components of a math-talk learning community – Questioning 280-284 Explaining mathematical thinking 284-289  Source of mathematical ideas 289-293  Responsibility for learning 293-296	
<b>Class 4 Feb 13</b>	Differentiation	Brahier (2009): Chapter 11 Dodge Chapter 1,2 All	<b>Draft Top Level Outline Due</b>
<b>Class 5 Feb 20</b>	Differentiation/Diversity	<u>Teacher Experts</u> - Sign up for a Chapter AND for an additional reading Dodge Chapter 3  Dodge Chapter 4  Dodge Chapter 5  Dodge Chapter 6  Dodge Chapter 7  HO: Mathematics Instruction and Academic English: Adapting Problems for Varying English Proficiencies  HO: Building Responsibility for Learning in Students with Special Needs	

		HO: Mathematically Gifted in the Heterogeneously Grouped Mathematics Classroom: What is a Teacher to Do?	
<b>Class 6 Feb 27</b>	Assessment	Brahier (2009): Chapter 9 pp. 260-270 Brahier (2009) Chapter 10 pp. 296-303 Brahier (2001): Chapter 1	<b>BRING TO CLASS:</b> One lesson plan
<b>Class 7 March 6</b>	Assessment	Brahier (2009): Chapter 10 pp. 303-315 Brahier (2001): Chapters 2 and 3	Drafts of 2 (Minimum) Lesson Plans
<b>March 13</b>		<i>Spring Break</i>	
<b>Class 8 March 20</b>	Assessment	Brahier (2001): Chapters 4 and 5	<b>BRING TO CLASS:</b> Assessment plan: weights? alternative assessment idea, quiz topic
<b>Class 9 March 27</b>	MicroTeach	Reflection due by next class – submit in BB	Draft Assessment for Unit Plan
<b>Class 10 April 3</b>	MicroTeach	Reflection due by next class – submit in BB	
<b>Class 11 April 10</b>	MicroTeach	Reflection due by next class – submit in BB	<b>Unit Plan in a binder - DUE</b>
<b>Class 12 April 17</b>	MicroTeach	Reflection due by next class – submit in BB	
<b>Class 13 April 24</b>	Teacher in the Community/Behavi or Management	Brahier (2009): Chapter 12	<b>Assessment Plan in a binder – DUE</b>
<b>Class 14 May 1</b>	Final Unit Plan Presentations	Informal Presentation of Unit Plan lesson idea	<b>Field Work Assignment - DUE</b>
	Final Exam Day	Informal Presentation of Unit Plan lesson idea ( <i>Final Exam time: 4:30-7:15 pm</i> )	

## UNIT PLAN Scoring Rubric

The unit plan will be evaluated using two different rubrics: *InTASC* and *NCTM*. Together, these two rubrics evaluate teacher candidates' ability to demonstrate a variety of NCTM SPA standards for the Planning assessment.

For each of the standards the following scoring criteria are used:

- 0 – unacceptable
- 1 – marginal
- 2 – meets expectations
- 3 – exceeds expectations

**In order to pass this assignment, teacher candidates need to earn a mean score of at least 2.0 on each of the rubrics. Should a unit plan earn less than a mean score of 2.0 on either rubric, the teacher candidate will be asked to redo the unit plan until the minimum standard is met.**



## Rubric for *InTASC* Standards

### Content: *InTASC* Standard 1

SCORE \_\_\_\_\_

The teacher candidate understands the central concepts, tools of inquiry, and structures of the discipline he or she teaches and can create learning experiences that make these aspects of subject matter meaningful to students.

Performance Indicators:

- Uses Essential Relevant Content
- Organizes Instruction Around Unifying Themes
- Builds a Conceptual Framework
- Displays Content Accuracy
- Fosters Understanding of Disciplinary Norms and Ways of Thinking

*Interpretation for Mathematics: Instruction focuses on the “big ideas” of mathematics and shows connections between and among concepts. Students are engaged in discovery/inquiry-based activities whereby students make conjectures, explore relationships, and justify their thinking using multiple types of reasoning.*

Scoring:

0	1	2	3
Content in the lessons is not important or unified, and does not focus on the “big ideas” within mathematics. Students are not actively engaged in learning mathematics through discovery/inquiry-based activities.	Instruction does focus on the “big ideas” of mathematics but does not show connections between and among concepts. Students may or may not be engaged in learning mathematics through discovery/inquiry-based activities.	Instruction focuses on the “big ideas” of mathematics and shows connections between and among concepts. Students are engaged in learning mathematics through discovery/inquiry-based activities.	Instruction focuses on the “big ideas” of mathematics and shows connections between and among concepts. Students are regularly and meaningfully engaged in learning mathematics through discovery/inquiry-based activities.

### Student Learning *InTASC* Standard 2

SCORE \_\_\_\_\_

The teacher candidate understands how students learn and develop and can provide learning opportunities that support a student's intellectual, social, and personal development.

Performance Indicators:

- Fosters Active Student Involvement
- Uses Developmentally Appropriate Activities

*Interpretation for Mathematics: Students are actively engaged in exploration of mathematical ideas and concepts. Progression of activities is appropriately organized to facilitate the development of deep, conceptual understandings of mathematics.*

Scoring:

0	1	2	3
Students are not actively engaged in exploration of mathematical ideas and concepts. Progression of activities is not appropriately organized to facilitate the development of deep, conceptual understanding of mathematics.	Students are rarely actively engaged in exploration of mathematical ideas and concepts. Progression of activities is not appropriately organized to facilitate the development of deep, conceptual understanding of mathematics.	Students are rarely engaged in exploration of mathematical ideas and concepts. Progression of activities is appropriately organized to facilitate the development of deep, conceptual understanding of mathematics.	Students are regularly, actively engaged in exploration of mathematical ideas and concepts. Progression of activities is appropriately organized to facilitate the development of deep, conceptual understanding of mathematics.

### Diverse Learners *InTASC* Standard 3

SCORE \_\_\_\_\_

The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.

Performance Indicators:

- Attends to Different Learning Styles
- Attends to Different Learning Needs (e.g., ELL, learning disabilities, gender, etc.)
- Attends to Different Skill Levels
- Uses Activities Relevant to Students

*Interpretation for Mathematics: Students are actively engaged in meaningful learning of mathematics in ways that connect the mathematics to their worlds. Appropriate scaffolding is used to help students of various skill levels to develop strong understandings of mathematics. Note: This does not mean a lowering of the standards. Rather it means appropriate supports are put in place to help all students learn meaningful mathematics.*

Scoring:

0	1	2	3
Lessons are not designed to attend to different learning styles, learning needs, or skill levels. Activities are not relevant to students nor do they enable students to engage in meaningful exploration of mathematics.	There is some evidence that lessons attend to different learning styles, learning needs, and skill levels – but it is rare. Activities are rarely relevant to students and rarely enable students to engage in meaningful exploration of mathematics.	Lessons frequently attend to different learning styles, learning needs, and skill levels. Activities are frequently relevant to students so that students are regularly engaging in meaningful exploration of mathematics.	Lessons regularly attend to different learning styles, learning needs, and skill levels. Activities are always relevant to students so that students are regularly engaging in meaningful exploration of mathematics.

*Instruction InTASC Standard 4*

*SCORE 1 \_\_\_\_, SCORE 2 \_\_\_\_, MEAN SCORE \_\_\_\_\_*

The teacher candidate understands and uses a variety of instructional strategies to encourage student development of critical thinking, problem solving, and performance skills.

Performance Indicators:

- Uses Variety of Strategies and Activities
- Uses Effective Questioning
- Fosters Higher-Order Thinking
- Encourages Student Thinking/Inquiry
- Fosters Student Creativity and Choices
- Demonstrates Teacher Creativity
- Incorporates Sufficient Detail to Teach
- Uses Coherent Connection among Activities

*Interpretation for Mathematics: Students are engaged in the problem-solving process. They are presented with high-level questions and tasks and asked to explore mathematical concepts in a variety of contexts. These tasks are creatively developed or chosen by the teacher and demonstrate connection both within mathematics and of mathematics to the real-world. Students are encouraged to apply and adapt strategies to solve problems and to use a variety of representations.*

Scoring (2 rubrics for this category):

0	1	2	3
Lessons do not encourage student thinking/inquiry nor do they engage students in higher-level thinking. Lessons do not foster student creativity/choice.	There is some evidence that lessons encourage student thinking/inquiry and engage students in higher-level thinking, but it is rare. Rarely do lessons foster student creativity/choice.	Lessons frequently encourage student thinking/inquiry and engage students in higher-level thinking. Lessons frequently foster student creativity/choice.	Lessons regularly encourage student thinking/inquiry and engage students in higher-level thinking. Lessons regularly foster student creativity/choice

0	1	2	3
Lessons do not exhibit teacher creativity. Activities	Rarely do lessons exhibit teacher creativity. Activities	Lessons frequently exhibit teacher creativity. Most	Lessons regularly exhibit teacher creativity. Activities

are not connected coherently nor are they varied. There is not enough detail provided to teach the lesson.	are somewhat coherently connected and varied. Most details are there to teach the lesson.	activities are coherently connected and varied. There is enough detail provided to teach.	are coherently connected and varied. There is enough detail provided to teach.
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*Learning Environment InTASC Standard 5*

SCORE \_\_\_\_\_

The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.

Performance Indicators:

- Establishes Routines
- Uses Individual Work
- Organizes Group Work
- Anticipates/Avoids Potential Discipline Problems

*Interpretation for Mathematics: The learning environment is set-up (on a daily basis) to promote individual and group work and to support student learning through avoidance of potential discipline problems.*

Scoring:

0	1	2	3
Lessons do not provide structure. There are not opportunities for <u>both</u> individual and group work.	Lessons provide structure. Rarely are there opportunities for <u>both</u> individual and group work.	Lessons provide structure. There are regular opportunities for <u>both</u> individual and group work.	Lessons provide structure. There are frequent opportunities for <u>both</u> individual and group work.

*Communication InTASC Standard 6*

SCORE 1 \_\_\_\_, SCORE 2 \_\_\_\_, MEAN SCORE \_\_\_\_\_

The teacher candidate uses knowledge of effective verbal, non-verbal and media communication techniques and appropriate technology to foster active inquiry, collaboration, and supportive interaction in the classroom.

Performance Indicators:

- Uses Effective Communication to Foster Inquiry
- Integrates Technology
- Fosters Collaboration
- Encourages Communication among Students
- Encourages Communication between Students and Teacher

*Interpretation for Mathematics: Instruction incorporates technology facilitate learning of mathematics by enabling students to explore mathematics. The learning environment supports communication between and among teachers and students. Students are actively engaged with questions/tasks that encourage exploration. Students are asked to make conjectures, regularly analyze other students' thinking, and organize their own and others' thinking about mathematics.*

Scoring (2 rubrics for this category):

0	1	2	3
Lessons do not provide opportunities for students to communicate their thinking with each other and the teacher. There are no opportunities for collaboration. .	Lessons rarely provide opportunities for students to communicate their thinking with each other and the teacher. There are rare opportunities for collaboration. .	Lessons regularly provide opportunities for students to communicate their thinking with each other and the teacher. There are regular opportunities for collaboration.	Lessons frequently provide opportunities for students to communicate their thinking with each other and the teacher. There are frequent opportunities for collaboration.

0	1	2	3
Technology is not infused in any lessons.	Technology is infused into some lessons but it is not used to facilitate meaningful mathematical exploration.	Technology is infused into some lessons and it is used to facilitate meaningful mathematical exploration.	Technology is infused into many lessons and is used to facilitate meaningful mathematical exploration.

**Planning InTASC Standard 7**

SCORE \_\_\_\_\_

The teacher candidate plans instruction based upon knowledge of subject matter, state and national standards, students, and the community.

Performance Indicators:

- Clearly Connects to Nat'l/State Standards
- Clearly connects to Course Objectives
- Relates Daily Question(s) or Objective(s) to Unit Question
- Relates Daily Activities to Question(s) or Objective(s)
- Relates Assessment to Questions/Objectives
- Develops Content Logically and Coherently

*Interpretation for Mathematics: Instruction clearly connects to NCTM and VA SOL standards. All activities are appropriately designed to help students meet the specified objectives.*

Scoring:

0	1	2	3
Lesson plans do not connect to standards. Activities and assessment do not align to expressed standards, nor do they develop in a logical way.	Rarely do lesson plans connect to standards. Activities and assessment do not align to expressed standards, nor do they develop in a logical way.	Lesson plans connect to standards. Activities and assessment are regularly aligned to expressed standards and regularly develop in a logical way.	Lesson plans connect to standards. Activities and assessment are frequently aligned to expressed standards and frequently develop in a logical way.

**Assessment InTASC Standard 8**

SCORE \_\_\_\_\_

The teacher candidate understands and uses formal and informal assessment strategies, consistent with instructional goals, to evaluate and ensure the continuous intellectual, social, and physical development of the learner.

Performance Indicators:

- Uses Variety of Formal/Informal Assessments
- Assesses Essential Understanding and Skills
- Assesses Higher Order Thinking Skills
- Incorporates Student Self-Assessment
- Uses Assessment to Inform Instruction

*Interpretation for Mathematics: Assessment focused both on high- and low-level tasks/questions. Questions are designed to gain insight into students' procedural and conceptual understandings of important mathematics concepts and to assess their ability to problem solve. These assessments provide opportunities for students to assess their own understandings and reflect on their problem solving. The teacher uses these assessments to inform instruction.*

Scoring (Score on this rubric is taken from the Assessment Assignment):

0	1	2	3
A variety of assessments are not used. Assessments do not assess higher order thinking, conceptual understanding, procedural skill, or problem solving. Assessment does not encourage self-assessment.	There is some variety in the choice of assessments. Rarely do assessments assess higher order thinking, conceptual understanding, procedural skill, or problem solving. Assessment may or may not encourage self-assessment.	There is some variety in the choice of assessments. Assessments assess higher order thinking, conceptual understanding, procedural skill, and problem solving to some degree. Assessment may or may not encourage self-assessment.	There is some variety in the choice of assessments. Assessments do a great job of assessing higher order thinking, conceptual understanding, procedural skill, and problem solving. Assessments encourage self-assessment.

**Reflection InTASC Standard 9**

SCORE \_\_\_\_\_

The teacher candidate is a reflective practitioner who continually evaluates the effects of his or her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.

Performance Indicators:

- Presents Thoughtful/Coherent Research-based Rationale
- Shows Evidence of Reflection on this Rubric

*Interpretation for Mathematics: The teacher engages in evidence-based reflection on the effectiveness of instruction to promote the development of problem solving skills and procedural/conceptual understanding of students.*

Scoring:

0	1	2	3
Narrative and lessons do not provide evidence of reflection on research and suggestions of leaders in the field. Claims for instructional decisions are not well justified.	Narrative and lessons provide some evidence of reflection on research and suggestions of leaders in the field. Claims for instructional decisions are not well justified.	Narrative and lessons provide evidence of reflection on research and suggestions of leaders in the field. Claims for instructional decisions are well justified.	Narrative and lessons provide evidence of deep reflection on research and suggestions of leaders in the field. Claims for instructional decisions are very well justified.

*Collaboration InTASC Standard 10*

SCORE \_\_\_\_\_

The teacher candidate fosters relationships with school colleagues, parents, and agencies in the larger community to support students and their well being.

Performance Indicators:

- Fosters Professional or Community Relationships
- Uses Books, Internet, Research, and Other Resources)

*Interpretation for Mathematics: The teacher is aware of professional resources for mathematics teachers (collaboration, journals, NCTM publications, technology) and consults these resources during planning.*

Scoring:

0	1	2	3
No professional resources were used in construction of lessons.	There is some evidence of consultation to professional resources in the construction of the lessons.	There is evidence of consultation to professional resources in the construction of the lessons. Modifications to meet the needs of the lesson are mostly appropriate.	There is evidence of consultation to professional resources in the construction of the lessons. Modifications to meet the needs of the lesson are very appropriate.

### Rubric for *NCTM* Standards

Each of the *NCTM* standards will be evaluated using the following rubric:

0	1	2	3
The candidate exhibits little, or irrelevant, evidence of meeting the standard for planning, teaching, and student learning.	The candidate exhibits insufficient evidence of performance in relation to essential knowledge, skills, dispositions required by the standard. Provides fundamental evidence of attainment but does not yet meet minimum expectations for planning, teaching, and student learning.	The candidate exhibits performance that meets the standard in essential knowledge, skills and dispositions. Provides evidence of sound work, usually with multiple examples of achievement which substantially meet basic expectations for planning, teaching, and student learning.	The candidate exhibits mastery of the knowledge, skills and dispositions required by the standard. Achieves an exceptional level of performance in relation to expectations of the program and generally provides multiple examples of excellence in performance for planning, teaching, and student learning.

#### Knowledge of Mathematical Problem Solving *NCTM* Standard 1

MEAN SCORE \_\_\_\_\_

Candidates know, understand, and apply the process of mathematical problem solving.

Plan includes opportunities for students to engage in the following:

Apply and adapt strategies	0 1 2 3
Employ multiple contexts	0 1 2 3
Build mathematical knowledge	0 1 2 3
Reflect on problem solving	0 1 2 3

#### Knowledge of Reasoning and Proof *NCTM* Standard 2

MEAN SCORE \_\_\_\_\_

Candidates reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry. Plans do the following:

Include opportunities for proof	0 1 2 3
Investigate conjectures	0 1 2 3
Develop arguments	0 1 2 3
Use multiple types of reasoning	0 1 2 3

#### Knowledge of Mathematical Communication *NCTM* Standard 3

MEAN SCORE \_\_\_\_\_

Candidates communicate their mathematical thinking orally and in writing to peers, faculty, and others. Plans do the following:

Communicate mathematics clearly	0 1 2 3
Use precise mathematics language	0 1 2 3
Allow for students and the teacher to organize thinking with communication	0 1 2 3
Provide opportunities for teacher and student to analyze other's thinking	0 1 2 3

**Knowledge of Mathematical Connections *NCTM* Standard 4****MEAN SCORE** \_\_\_\_\_

Candidates recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding.

Use connections between ideas 0 1 2 3

Apply and recognize math in outside contexts 0 1 2 3

Demonstrate connections between ideas 0 1 2 3

**Knowledge of Mathematical Representation *NCTM* Standard 5****MEAN SCORE** \_\_\_\_\_

Candidates use varied representations of mathematical ideas to support and deepen students' mathematical understanding.

Use representations to model 0 1 2 3

Use representations to communicate 0 1 2 3

Use representations in problem solving 0 1 2 3

**Knowledge of Technology *NCTM* Standard 6****SCORE** \_\_\_\_\_

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

Use knowledge of mathematics to select various technological tools 0 1 2 3

## Score Summary Sheet

<b><i>InTASC</i> Standard</b>	<b>Score</b>
Content	
Student Learning	
Diverse Learners	
Instruction	
Learning Environment	
Communication	
Planning	
Assessment	
Reflection	
Collaboration	
<i>Mean Score</i>	

<b><i>NCTM</i> Standard</b>	<b>Score</b>
Mathematical Problem Solving	
Reasoning and Proof	
Mathematical Communication	
Mathematical Connections	
Mathematical Representation	
Technology	
<i>Mean Score</i>	

Did the teacher candidate earn an overall mean score of at least 2.0 on the *InTASC* rubric? \_\_\_\_\_

Did the teacher candidate earn an overall mean score of at least 2.0 on the *NCTM* rubric? \_\_\_\_\_

Overall mean score (sum of all scores divided by 16) \_\_\_\_\_

Grade as Percentage:  $1.5 \left[ \frac{(\text{overall mean} - 2)}{.1} \right] + 85 =$  \_\_\_\_\_

Strengths:

Areas for Development: