



**GEORGE MASON UNIVERSITY**  
**COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT**  
**GRADUATE SCHOOL OF EDUCATION**  
**Secondary Education**

**EDCI 572 003: Teaching Mathematics in the Secondary School**  
 3 Credits, Spring 2016

**Instructor Information**

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**COURSE DESCRIPTION:**

**A. Prerequisites/Corequisites**

None

**B. University Catalog Course Description**

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. This course is for students who have already taken or are concurrently taking EDUC 522.

**C. Expanded Course Description**

As a future secondary mathematics teacher, you have the opportunity to shape the future. You can play an important role in the development of adolescents and have an influence on the way in which they come to understand the world in which they live. You can help students to develop strong understandings of mathematics and its uses, understandings that are foundational for work beyond high school. Further, you can shape their dispositions toward learning mathematics. You have chosen an amazing and rewarding career path!

In this course, you will come to develop knowledge, skills, and understandings that will be useful to you in your work as a secondary mathematics teacher. Though there are no “easy recipes” for helping students learn mathematics, research has identified *characteristics* of effective mathematics teaching. Throughout the semester, we will explore these

characteristics and ways in which you can incorporate them into your teaching. You will learn how to be reflective about your work and that of other teachers so that you can continue to draw on and build upon the knowledge and understandings you gain in this course throughout your career as a secondary mathematics teacher who is equipped to help *all* children thrive in secondary mathematics classroom.

### **DELIVERY METHOD:**

As this is an independent study course, it will be delivered primarily online using a mostly asynchronous format via the Blackboard learning management system (LMS) housed in the MyMason portal. You will log in to the Blackboard course site using your Mason email name (everything before “@masonlive.gmu.edu) and email password. The course site will be available on January 19, 2016.

Additionally, we will meet 2 times face-to-face and two times via Collaborate during the semester for teaching demonstrations and dissemination of important information.

### **TECHNICAL REQUIREMENTS:**

To participate in this course, students will need the following resources:

- High-speed Internet access with a standard up-to-date browser, either Internet Explorer or Mozilla Firefox. Opera and Safari are not compatible with Blackboard;
- Consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of the course requirements.
- The following software plug-ins for PCs and Macs respectively, available for free downloading by clicking on the link next to each plug-in:
  - Adobe Acrobat Reader: <http://get.adobe.com/reader/>
  - Windows Media Player: <http://windows.microsoft.com/en-US/windows/downloads/windows-media-player>
  - Apple Quicktime Player: [ww.apple.com/quicktime/download/](http://www.apple.com/quicktime/download/)
  - Apple Quicktime Player
  - A headset microphone for use with the Blackboard Collaborate web conferencing tool

### **EXPECTATIONS:**

- **Course Week:** Refer to the asynchronous bullet below if your course is asynchronous or the synchronous bullet if your course is synchronous.
  - Asynchronous: Because asynchronous courses do not have a “fixed” meeting day, our week will **start** on Monday and **finish** on Friday.
- **Log-in Frequency:**

- Asynchronous: Students must actively check the course Blackboard site and their GMU email for communications from the instructor, at a minimum this should be 3 times per week.
  - Synchronous: Students must log-in for all scheduled online synchronous meetings.
- **Participation:** Students are expected to actively engage in all course activities throughout the semester, which include viewing of all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- **Technical Competence:** Students are expected to demonstrate competence in the use of all course technology. Students are expected to seek assistance if they are struggling with technical components of the course.
- **Technical Issues:** Students should expect that they could experience some technical difficulties at some point in the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
- **Workload:** Expect to log in to this course **at least 2-3 times a week** to read announcements, participate in the discussions, and work on course materials. Remember, this course is **not** self-paced. There are **specific deadlines** and **due dates** listed in the **CLASS SCHEDULE** section of this syllabus to which you are expected to adhere. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- **Advising:** If you would like to schedule a one-on-one meeting to discuss course requirements, content or other course-related issues, and you are unable to come to the Mason campus, we can meet via telephone or web conference. Send me an email to schedule your one-on-one session and include your preferred meeting method and suggested dates/times.
- **Netiquette:** Our goal is to be **collaborative**, not combative. Experience shows that even an innocent remark in the online environment can be misconstrued. I suggest that you always re-read your responses carefully before you post them to encourage others from taking them as personal attacks. **Be positive in your approach to others and diplomatic with your words.** I will do the same. Remember, you are not competing with each other but sharing information and learning from one another as well as from the instructor.

## **LEARNER OUTCOMES or OBJECTIVES:**

Success in this course is measured by the degree to which you are able to meet the following Standards as set forth by the National Council for Teachers of Mathematics:

- Demonstrate an understanding of the ways in which students develop strong, usable understandings of secondary mathematics content
- Analyze instruction and instructional materials for their potential to promote student learning of secondary mathematics content in diverse settings
- Design tasks, including those that rely on technology, that foster the development of deep understanding of secondary mathematics concepts

- Justify instructional decisions by reference to research findings, national standards, and learning theory
- Demonstrate the dispositions appropriate to work as a secondary mathematics teacher
- Continue to develop your own knowledge of mathematics and problem solving ability as you explore mathematics from the perspective of a teacher and student
- Analyze different perspectives on mathematics teaching and learning - graduate students only
- Develop knowledge, skills, and professional behaviors across secondary settings, examine the nature of mathematics, how mathematics should be taught, and how students learn mathematics; and observe and analyze a range of approaches to mathematics teaching and learning

## **PROFESSIONAL STANDARDS**

This course aligns with the National Content Standards and identified by their Specialized Professional Association (SPA): National Council of Teachers of Mathematics, <http://www.nctm.org>.

**NCTM Secondary Mathematics Standard 1, Content Knowledge:** Preservice teacher candidates: demonstrate and apply knowledge of major mathematics concepts, algorithms, procedures, applications in varied contexts, and connections within and among mathematical domains (Number, Algebra, Geometry, Trigonometry, Statistics, Probability, Calculus, and Discrete Mathematics) as outlined in the NCTM CAEP Mathematics Content for Secondary.

**NCTM Secondary Mathematics Standard 2, Mathematical Practices:** Effective teachers of secondary mathematics solve problems, represent mathematical ideas, reason, prove, use mathematical models, attend to precision, identify elements of structure, generalize, engage in mathematical communication, and make connections as essential mathematical practices. They understand that these practices intersect with mathematical content and that understanding relies on the ability to demonstrate these practices within and among mathematical domains and in their teaching.

**NCTM Secondary Mathematics Standard 3, Content Pedagogy:** Effective teachers of secondary mathematics apply knowledge of curriculum standards for mathematics and their relationship to student learning within and across mathematical domains. They incorporate research-based mathematical experiences and include multiple instructional strategies and mathematics-specific technological tools in their teaching to develop all students' mathematical understanding and proficiency. They provide students with opportunities to do mathematics – talking about it and connecting it to both theoretical and real-world contexts. They plan, select, implement, interpret, and use formative and summative assessments for monitoring student learning, measuring student mathematical understanding, and informing practice.

**NCTM Secondary Mathematics Standard 4, Mathematical Learning Environment:**

Effective teachers of secondary mathematics exhibit knowledge of adolescent learning, development, and behavior. They use this knowledge to plan and create sequential learning opportunities grounded in mathematics education research where students are actively engaged in the mathematics they are learning and building from prior knowledge and skills. They demonstrate a positive disposition toward mathematical practices and learning, include culturally relevant perspectives in teaching, and demonstrate equitable and ethical treatment of and high expectations for all students. They use instructional tools such as manipulatives, digital tools, and virtual resources to enhance learning while recognizing the possible limitations of such tools.

**NCTM Secondary Mathematics Standard 7, Secondary Mathematics Field Experiences and**

**Clinical Practices:** Effective teachers of secondary mathematics engage in a planned sequence of field experiences and clinical practice under the supervision of experienced and highly qualified mathematics teachers. They develop a broad experiential base of knowledge, skills, effective approaches to mathematics teaching and learning, and professional behaviors across both middle and high school settings that involve a diverse range and varied groupings of students. Candidates experience a full-time student teaching/internship in secondary mathematics directed by university or college faculty with secondary mathematics teaching experience or equivalent knowledge base.

**REQUIRED TEXTS:**

Brahier, D.J. (2012). *Teaching secondary and middle school mathematics* (4<sup>th</sup> edition). Boston: Pearson Education Inc.

Donovan, M. S., & Bransford, J. D. (2005). *How students learn: Mathematics in the classroom*. Washington, D.C.: The National Academies Press. We will look at excerpts from this text, which can be retrieved from the following website:  
[http://www.nap.edu/catalog.php?record\\_id=11101](http://www.nap.edu/catalog.php?record_id=11101)

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding it up: Helping children learn mathematics*. Washington, D.C.: The National Academies Press. We will look at excerpts from this text, which can be retrieved from the following website:  
[http://www.nap.edu/catalog.php?record\\_id=9822](http://www.nap.edu/catalog.php?record_id=9822)

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author. Excerpts can be found on-line at  
<http://standards.nctm.org/>

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State Standards Mathematics*. National Governors Association Center for Best Practices, Council of Chief State School Officers,

Washington D.C. The standards can be retrieved from:

<http://www.corestandards.org/Math>

Virginia Standards of Learning available at

<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>

**Recommended:**

NCTM Student Membership. Provides access to (1) Online subscription to *Teaching Mathematics* in the Middle School (for the middle grades), *Mathematics Teacher* (for the high school grades), or other school journals, (2) Online NCTM 2000 *Principles and Standards for School Mathematics*; and (3) access to online articles; available from the National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091; 703-620-9840; [www.nctm.org](http://www.nctm.org) website.

**COURSE ASSIGNMENTS AND EXPECTATIONS:**

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

Assessment	Percentage of <i>Undergrad</i> Grade:	Percentage of <i>Graduate</i> Grade:
Participation and Preparation (including weekly assignments and readings)	25%	25%
Mathematics Autobiography	10%	10%
Procedural/Conceptual Assignment	15%	10%
Position Papers	15%	10%
Field Work Assignments	15%	15%
Collection of Activities: Analysis and Critique		10%
Lesson Plan and Related Assignments	20%	20%

***Mathematics Autobiography***

John Graham's famous quote states, "We teach who we are." Contemporary research in mathematics education finds this to be especially true for secondary mathematics teachers. It is important to examine our own assumptions about teaching and learning mathematics as result of our leaning experiences. In this activity, you will spend some time reflecting on your personal experiences as a mathematics learner. You will use your responses as part of an in-class activity as well as a culminating activity at the end of the course.

***Procedural/Conceptual Assignment***

Individuals can understand mathematics in different ways. In order to demonstrate proficiency in mathematics, one needs, among other things, both procedural knowledge and conceptual understanding of mathematics. Teachers need to design lessons that develop both. A first step is outlining what those terms mean with respect to the concept a teacher is about to teach. In this assignment, you will have the opportunity to analyze a mathematical concept and to explain what it means to have procedural knowledge and conceptual understanding of that concept.

### ***Position Papers***

Mathematics education is always in flux. Issues like Common Core and standardized assessments bring new complexities to the field of mathematics. Additionally, there are some issues in the field that will always be up for debate, discussion, and reflection. Throughout the semester, you will be required to respond to prompts that raise issues regarding contemporary and long-standing issues in mathematics education. We will use your position papers and springboards for discussion and whole-group reflection.

### ***Field Work Assignments***

One of the most valuable pieces of pre-service teacher training is the opportunity to do field work. You will complete 15 hours of field work and keep a log of these hours for submission at the end of the semester. Throughout the semester, you will be required to complete observation assignments during your field work. These assignments provide you with opportunities to reflect upon the practice of teaching after having watched instances of teaching in real world settings.

### ***Collection of Activities: Analysis and Critique (Graduate Students, Only)***

This assignment will give you the opportunity to build your repertoire of teaching “tools.” You will choose a secondary mathematics topic OR a particular teaching method or strategy and research them in practitioner journals. You will then summarize and critique the writings ideas and consider ways that you might use them (possibly in modified form) in your future work as a teacher. You will then share these ideas with your classmates so that everyone will have a collection of teaching ideas to take with them.

### ***Lesson Plan Assignment and Presentation***

Throughout the 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 have gained in the creation of a series of lesson plans. Within these lessons, you will design lessons that pay attention to the use of technology, the development of student understanding of mathematics content, various standards documents, and problem-based instruction. After submission of the lesson plan, you will present your ideas to your peers so that the entire class can begin to create a collection of teaching ideas for various content areas within secondary mathematics. You must meet minimum standard on this, or you will be asked to resubmit.

## **TK20 PERFORMANCE-BASED ASSESSMENT SUBMISSION REQUIREMENT**

Every student registered for any Secondary Education course with a required performance-based assessment is required to submit this assessment, Lesson Plan to Tk20 through Blackboard (regardless of whether the student is taking the course as an elective, a onetime course or as part of an undergraduate minor). Evaluation of the performance-based assessment by the course instructor will also be completed in Tk20 through Blackboard. Failure to submit the assessment to Tk20 (through Blackboard) will result in the course instructor reporting the course grade as Incomplete (IN). Unless the IN grade is changed upon completion of the required Tk20 submission, the IN will convert to an F nine weeks into the following semester.

## **GMU POLICIES AND RESOURCES FOR STUDENTS**

- a. Students must adhere to the guidelines of the George Mason University Honor Code (See <http://oai.gmu.edu/the-mason-honor-code/>).
- b. Students must follow the university policy for Responsible Use of Computing (See <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- c. 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.
- d. 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/>).
- e. Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services and inform their instructor, in writing, as soon as possible. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (See <http://ods.gmu.edu/>).
- f. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- g. 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/>).

## **PROFESSIONAL DISPOSITIONS**

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

## **CORE VALUES COMMITMENT**

The College of Education & Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

**For additional information on the College of Education and Human Development,  
Graduate School of Education, please visit our website <http://gse.gmu.edu/>.**

**Tentative Class Schedule**

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

Additional smaller assignments and readings may be made each week. Additionally, at times different students will read different readings and share their understandings with the class. All readings noted with “see course site” will be available on Blackboard at least a week before they are to be read for class.

Date	Topic	Readings	Assignment Due
Jan 19	<b>Face to Face Meeting</b> <b>The Nature of Mathematics and the Reform Movement in Mathematics Education</b> <ul style="list-style-type: none"><li>• The State of Mathematics Education</li><li>• Trends in Mathematics Education</li><li>• Creating a Vision for Your Mathematics Teaching</li><li>• Why Teach Mathematics?</li></ul>	Brahier: Chapter 1	
Jan 26	<b>Mathematical Proficiency &amp; Identities</b> <ul style="list-style-type: none"><li>• Examining Our Mathematical Experiences</li><li>• What does it mean to be “mathematically proficient”?</li><li>• Student status and motivation as it relates to proficiency</li></ul>	Donovan & Bransford: pp. 217-224; 231-236; 236-240  Aguire, Mayfield-Ingram, & Martin (2014) – (572 ONLY) See course site  Watch Mindsets video	<b>Mathematics Autobiography due (upload to Blackboard)</b>
Feb 2	<b>Learning Theory and Implications for Instruction</b> <ul style="list-style-type: none"><li>• Constructivist &amp; sociocultural perspectives on learning mathematics</li><li>• Conceptual vs. procedural understanding</li><li>• What does it mean to create rich, student-centered tasks?</li></ul>	Brahier Ch. 3: pp. 48-50; 56-66  Kilpatrick et al: pp.115-124; 131-133  Brahier: pp.212-217	<b>Position Paper #1 due to Blackboard</b>

<b>Feb 9</b>	<b>Differentiating Learning for All Students</b>	Bartell & Meyer (2008) McDuffie et al. (2011) Watch Treisman video	
<b>Feb 16</b>	<b>Face To Face Meeting Using Manipulatives to Support Instruction</b> <ul style="list-style-type: none"><li>• Algebra Tiles</li><li>• Cuisenaire Rods</li></ul>	Brahier: pp. 176-183	<b>Position Paper #2 due to Blackboard</b>
<b>Feb 23</b>	<b>Instructional Design and Learning Objectives</b> <ul style="list-style-type: none"><li>• NCTM Curricular Standards</li><li>• State- and Local-level Objectives</li><li>• Common Core Standards</li><li>• Implementing a Course of Study<ul style="list-style-type: none"><li>◦ Goals and Objectives</li><li>◦ Role of Textbooks</li><li>◦ Alternative Sources</li></ul></li></ul>	Brahier: pp.74-82; 121-131  Brahier: pp. 237-248	
<b>March 1</b>	<b>Effective Use of Technology in Secondary Mathematics Classrooms</b>	Doerr & Zangor (2000)- 572 only  Thomas & Sproule (1998)	<b>Procedural/Conceptual Assignment Due (Upload to Blackboard)</b>
<b>March 8</b>	<b>Spring Break - No Class</b>		
<b>March 15</b>	<b>Meet via Collaborate</b> <b>Planning for Instruction</b> Components of Lesson Plans <ul style="list-style-type: none"><li>• Lesson Plan Components</li><li>• Launching Lessons</li><li>• Effectively Summarizing Lessons</li></ul>	Brahier: pp. 141-165  Smith, Bill, & Hughes (2008) See course site	<b>Select Lesson Plan topic and appropriate VA SOL Standards – Upload to Blackboard</b>
<b>March 22</b>	<b>Planning for Instruction (Continued)</b>	Brahier: 172-175; 186-204  Smith, Hughes, Engle, & Stein (2009) (572 ONLY) See course site	At least <b>7 hours</b> of fieldwork completed  <b>Position Paper #3 due to Blackboard</b>

<b>March 29</b>	<b>Establishing a Learning Environment Conducive to Student Engagement</b> <ul style="list-style-type: none"><li>• Classroom set-up</li><li>• Role of Discourse</li><li>• Effective Questioning</li><li>• Cooperative Learning</li></ul>	Herbel-Eisenman & Breyfogle (2005)  Reinhart (2000)	<b>Draft of lesson plan #1 due (online support workshop in Blackboard)</b>
<b>April 5</b>	<b>Meet via Collaborate</b> <b>Focus On Algebra</b> <ul style="list-style-type: none"><li>• Big Ideas</li><li>• Algebraic Habits of Mind</li></ul>	Kinach (2014)  Driscoll (1999 – 572 ONLY)  See course site	<b>Upload revised version of lesson plan #1 to Blackboard</b>
<b>April 12</b>	<b>Focus On Algebra</b> <ul style="list-style-type: none"><li>• Role of Representations (Rule of 4)</li><li>• Functions Approach</li></ul>	Laughbaum (1999)  See course site	
<b>April 19</b>	<b>Equity and Algebra</b> <ul style="list-style-type: none"><li>• Algebra as a Gatekeeper</li><li>• Algebra Acceleration</li></ul>	Checkley (2001)  Choike (2000)	<b>Position Paper #4 due to Blackboard</b>
<b>April 26</b>	<b>Face-to-Face Meeting</b> <b>Lesson Plan Presentations and Revisiting our Mathematics Autobiographies</b>  <b>Looking Ahead to Methods 2</b>		<b>All field work completed with accompanying assignments and log sheet (Upload to Blackboard)</b>
<b>May 10</b>	<b>Complete and submit final assignments</b> <ul style="list-style-type: none"><li>• Collection of Activities (grad students ONLY)</li><li>• Lesson Plan Assignment</li></ul>		<b>Lesson Plan Assignment Due by December 15</b>

**Secondary Education (SEED) Program**  
**Lesson Planning Assessment**

**Methods I Courses**

**Assessment Objective**

- The candidate will develop a research-supported lesson plan that effectively meets the needs of a specific population of students.

**Research base/Rationale**

It is important that teacher candidates demonstrate their ability to design an effective lesson plan with specific, performance-based learning objectives that meet the learning needs of their students. Lesson planning can be guided by four basic questions: (adapted from Spencer, 2003, p. 251).

1. Who am I teaching? The number of learners, their academic level and prior knowledge.
2. What am I teaching? The content or subject, the type of learning (knowledge, skills, behaviors).
3. How will I teach it? Teaching models, learning strategies, length of time available, materials, technology resources, differentiation/modifications, etc.
4. How will I know if the students understand? Informal and formal assessments, formative and summative, higher order questioning techniques, feedback from learners, etc.

Additional questions to consider:

- What do students know already?
- Where have students come from and what are they going on to next?
- How can I build in sufficient flexibility cope with emergent needs?

For this course, a lesson plan must be developed for one teaching session (assuming a blocked class of 85-90 minutes). As you gain pedagogical content knowledge and become proficient, your lesson planning may become less detailed. For this assessment, however, we are looking for substantial detail to enable us to evaluate your planning.

Part of the planning process includes considering the following tasks:

- begin with developing goals/objectives and assessment ideas
- list content and key concepts (research more if needed)
- define your aims and identify specific learning outcomes or objectives
- develop assessments that are aligned to your specific objectives
- think about the structure of the lesson, pacing, and transitions
- identify adaptations/modifications/extensions needed to meet student needs
- determine “best practice” and learning strategies aligned to the learning outcomes
- identify learning resources and support materials
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### **Assessment Task**

Develop a lesson plan using the template attached. Review the rubric to guide the development of your lesson plan.

NOTE: Lesson plans will be evaluated based on adherence to the provided lesson plan format; consistency with instructional methods taught in the program; appropriate rationale provided; specification of objectives, as related to state and national standards; appropriate match between assessment of learning and learning objectives; coherence of writing and mechanics.

### **How to Submit this Assessment**

Submit your lesson plan to Blackboard. See course schedule for due date.

Name:	Date:
School:	Subject/Grade level:
Lesson Title:	
LESSON PLANNING	<i>Optional</i> Teaching Points/ Cues/Time
Performance-based Objective(s):	
Local/State/National Standards:	
Materials:	
Technology:	

<b>Accommodations:</b>	
<b>Extensions</b>	

## EDCI 372/572

### Rubric for Performance Based Assessment: Lesson Plan Assignment

Teacher candidates receive a score of 0, 1, 2, or 3 on each element. In order to pass the assignment, teacher candidates must earn a minimum of “1” on all categories and a mean of at least “2” on the entire rubric. Candidates earning lower than a mean of “2” or a “0” on any category will be required to redo the assignment.

	<b>Exceeds Standards 4</b>	<b>Meets Standards 3</b>	<b>Approaches Standard 2</b>	<b>Does Not Meet Standard 1</b>
<b>Lesson Construction</b> <i>InTASC: 7</i>	Lesson and assignment are written in alignment with specified formatting. All accompanying materials/resources are included. Each resource is clear and appealing to students.	Lesson and assignment are written in alignment with specified formatting. All accompanying materials/resources are included. Some resources are not clear and/or appealing to students.	Lesson and assignment are written in alignment with specified formatting. Some materials are missing and/or all materials are unclear to students.	Lesson and assignment are not written in alignment with specified formatting and/or all submitted accompanying materials are not clear to students.
<b>Goals/Objectives</b> <i>InTASC: 7</i>	All goals and objectives are written to describe learning <b><i>outcomes</i></b> and are aligned with state and NCTM standards. None are extraneous.	Some objectives/goals are not written to describe learning <b><i>outcomes</i></b> . Most of the objectives/goals are related to standards. None are extraneous.	Objectives/goals are not written as learning <b><i>outcomes</i></b> . Some of the objectives/goals are related to standards. Some are extraneous.	Objectives/goals are missing, unclear, or are unrelated to standards. Some or all are extraneous.
<b>Content</b> <i>InTASC: 1</i>	Instruction focuses on the “big ideas” of mathematics and shows connections between and among concepts. Content is represented accurately and developed logically.	Instruction focuses on the “big ideas” of mathematics but some connections between and among concepts may be missing. Content is represented accurately but, at times, may have gaps in its logical development.	Instruction does not focus on the “big ideas” of mathematics and does not show connections between and among concepts. Content is, represented accurately but, at time, may have gaps in its logical development.	Instruction does not focus on the “big ideas” of mathematics and does not show connections between and among concepts. Content is not represented accurately and/or developed logically.
<b>Student Learning</b> <i>InTASC: 2</i>	All planned activities are developmentally appropriate and provide opportunities for students to engage in meaningful exploration of mathematics in the development of conceptual understanding and procedural knowledge.	Most planned activities are developmentally appropriate and provide opportunities for students to engage in meaningful exploration of mathematics in the development of conceptual understanding and procedural knowledge.	Some planned activities are developmentally appropriate and provide opportunities for students to engage in meaningful exploration of mathematics in the development of conceptual understanding and procedural knowledge.	None of the planned activities are developmentally appropriate nor do they provide opportunities for students to engage in meaningful exploration of mathematics in the development of conceptual understanding and procedural knowledge.

<b>Instructional Activities</b> <i>InTASC: 4</i>	Instruction regularly incorporates variety of activities, engages students in high-level thinking, is problem-/inquiry-based, and is creatively designed.	Instruction often incorporates a variety of activities, engages students in high-level thinking, is problem-/inquiry-based, and is creatively designed.	Instruction rarely incorporates a variety of activities, engages students in high-level thinking, is problem-/inquiry-based, and is creatively designed.	Instruction does not incorporate a variety of activities, engage students in high-level thinking, is not problem-/inquiry-based, and is not creatively designed.
<b>Technology Integration</b> <i>InTASC: 6</i>	Technology is appropriately integrated and supports the development of student understanding of mathematics.	Some technology is used; it has limited appropriateness for some learners and/or does not support the development of student understanding of mathematics.	Technology is not appropriately used; technology does not match goals of the lesson and/or does not support the development of student understanding of mathematics.	Technology is not evident in the lesson.
<b>Communication</b> <i>InTASC: 5, 6 ,</i>	Instruction frequently provides opportunities for students to develop understandings collaboratively, in groups, as well as individually. Activities frequently encourage communication between and among students and teacher.	Instruction often provides opportunities for students to develop understandings collaboratively, in groups, as well as individually. Activities often encourage communication between and among students and teacher.	Instruction rarely provides opportunities for students to develop understandings collaboratively, in groups, as well as individually. Activities rarely encourage communication between and among students and teacher.	Instruction does not provide opportunities for students to develop understandings collaboratively, in groups, as well as individually. Activities do not encourage communication between and among students and teacher.
<b>Professional Resources</b> <i>InTASC: 10</i>	Lesson plans include at least one activity that is a modification of one found in a professional resource. Modifications and/or use in the lesson are well-designed to support student understanding of mathematics.	Lesson plans include at least one activity that is a modification of one found in a professional resource. Modifications and/or use in the lesson are not well-designed to support student understanding of mathematics.	Lesson plans include at least one activity that is a modification of one found in a professional resource. No attempt to modify was made.	Lesson plans do not include reference to outside source.

<b>Justification for Instructional Decisions</b>  <i>InTASC: 9, 10</i>	Instructional decisions are aligned with research-based recommendations. Narrative includes <i>meaningful</i> references to Brahier, NCTM, and additional readings for justification of instructional decisions. Narrative provides evidence of reflection on instruction designed to engage students in meaningful exploration of mathematical content that supports development of the NCTM process standards.	Instructional decisions are aligned with research-based recommendations. Narrative includes a few references to Brahier, NCTM, additional readings, and outside sources. Narrative provides evidence of reflection on instruction designed to engage students in meaningful exploration of mathematical content that supports development of the NCTM process standards	Instructional decisions are not aligned with research-based recommendations and/or narrative is weak with few references and/or little reflection on instruction designed to engage students in meaningful exploration of mathematical content that supports development of the NCTM process standards	Instructional decisions are not aligned with research-based recommendations. Narrative and reflection are weak and/or nonexistent.
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## NCTM Secondary Math SPA Standards

### **NCTM Standard 1a: Content Knowledge**

Candidates should demonstrate and apply knowledge of mathematical content.

Plans include opportunities for students to do the following:

<b>Standard</b>	<b>Exceeds Standards 4</b>	<b>Meets Standards 3</b>	<b>Approaches Standard 2</b>	<b>Does Not Meet Standard 1</b>
1a.1  Demonstrate knowledge of major mathematical concepts, algorithms, and procedures	Lessons are designed to address the big ideas of secondary mathematics content. Throughout, students are consistently engaged in activities that address all 3 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address all 4 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address most of the indicators.	Lessons are not designed to address the big ideas of secondary mathematics content. Students are not engaged in activities that address most of the indicators.
1a.2  Make connections between and among mathematical domains	Lessons are designed to address the big ideas of secondary mathematics content. Throughout, students are consistently engaged in activities that address all 3 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address all 4 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address most of the indicators.	Lessons are not designed to address the big ideas of secondary mathematics content. Students are not engaged in activities that address most of the indicators.

1a.3  Apply mathematics to varied contexts	Lessons are designed to address the big ideas of secondary mathematics content. Throughout, students are consistently engaged in activities that address all 3 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address all 4 indicators.	Lessons are designed to address the big ideas of secondary mathematics content. Students are somewhat engaged in activities that address most of the indicators.	Lessons are not designed to address the big ideas of secondary mathematics content. Students are not engaged in activities that address most of the indicators.
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### NCTM Standard 2: Mathematical Practices

Candidates solve problems, represent mathematical ideas, reason, prove, use mathematical models, attend to precision, identify elements of structure, generalize, engage in mathematical communication, and make connections as essential mathematical practices.

Plans include opportunities for students to engage in the following:

Standard	Exceeds Standards 4	Meets Standards 3	Approaches Standard 2	Does Not Meet Standard 1
2a  Use problem solving to develop conceptual understanding, make conjectures and generalizations, and apply and adapt a variety of strategies	Lessons are designed to fully engage students in activities that exhibit the mathematical practice.	Lessons are designed to partially engage students in activities in the mathematical practice.	Lessons are designed to engage students in activities that minimally engage students in the mathematical practice.	Lessons are not designed to engage students in activities that address the mathematical practice.
2b  Reason abstractly and quantitatively with attention to precision	Lessons are designed to fully engage students in activities that exhibit the mathematical practice.	Lessons are designed to partially engage students in activities in the mathematical practice.	Lessons are designed to engage students in activities that minimally engage students in the mathematical practice.	Lessons are not designed to engage students in activities that address the mathematical practice.
2c  Formulate, represent, analyze, and interpret mathematical models	Lessons are designed to fully engage students in activities that exhibit the mathematical practice.	Lessons are designed to partially engage students in activities in the mathematical practice.	Lessons are designed to engage students in activities that minimally engage students in the mathematical practice.	Lessons are not designed to engage students in activities that address the mathematical practice.

2d  Use the language of mathematics (e.g., vocabulary and symbols) to communicate mathematical ideas to others	Lessons are designed to fully engage students in activities that exhibit the mathematical practice.	Lessons are designed to partially engage students in activities in the mathematical practice.	Lessons are designed to engage students in activities that minimally engage students in the mathematical practice.	Lessons are not designed to engage students in activities that address the mathematical practice.
2e  Make connections between mathematical domains and the practices of problem solving, reasoning, communicating, connecting, and representing	Lessons are designed to fully engage students in activities that exhibit the mathematical practice.	Lessons are designed to partially engage students in activities in the mathematical practice.	Lessons are designed to engage students in activities that minimally engage students in the mathematical practice.	Lessons are not designed to engage students in activities that address the mathematical practice.

### NCTM Standard 3: Content Pedagogy

Candidates apply knowledge of curriculum standards for mathematics and their relationship to student learning  
Lesson Plans include evidence of the following:

Standard	Exceeds Standards 4	Meets Standards 3	Approaches Standard 2	Does Not Meet Standard 1
3a  Applying knowledge of curriculum standards for secondary mathematics and relationship to student learning within the lessons	Lessons are designed to demonstrate exceptional knowledge of the content pedagogy standard.	Lessons are designed to demonstrate proficient knowledge of the content pedagogy.	Lessons are designed to somewhat demonstrate knowledge of content pedagogy.	Lessons are not designed to demonstrate knowledge of the content pedagogy standard.
3b  Use of research to create rich mathematical learning experiences	Lessons are designed to demonstrate exceptional knowledge of the content pedagogy standard.	Lessons are designed to demonstrate proficient knowledge of the content pedagogy.	Lessons are designed to somewhat demonstrate knowledge of content pedagogy.	Lessons are not designed to demonstrate knowledge of the content pedagogy standard.

3c1 Use of instructional technologies to help students build conceptual understanding and procedural fluency	Lessons are designed to demonstrate exceptional knowledge of the content pedagogy standard.	Lessons are designed to demonstrate proficient knowledge of the content pedagogy.	Lessons are designed to somewhat demonstrate knowledge of content pedagogy.	Lessons are not designed to demonstrate knowledge of the content pedagogy standard.
3c2 A variety of strategies and differentiated instruction for diverse populations	Lessons are designed to demonstrate exceptional knowledge of the content pedagogy standard.	Lessons are designed to demonstrate proficient knowledge of the content pedagogy.	Lessons are designed to somewhat demonstrate knowledge of content pedagogy.	Lessons are not designed to demonstrate knowledge of the content pedagogy standard.
3d, 3e Opportunities for engagement and communication about mathematics (e.g., selecting high-quality tasks, guiding mathematical discussions, identifying key mathematical ideas, addressing student misconceptions)	Lessons are designed to demonstrate exceptional knowledge of the content pedagogy standard.	Lessons are designed to demonstrate proficient knowledge of the content pedagogy.	Lessons are designed to somewhat demonstrate knowledge of content pedagogy.	Lessons are not designed to demonstrate knowledge of the content pedagogy standard.

#### NCTM Standard 4: Mathematical Learning Environment

Candidates exhibit knowledge of adolescent learning, development, and behavior and use this knowledge to create learning opportunities that are grounded in mathematics education research in which students are actively learning and building on prior knowledge and skills.

Plans include:

Standard	Exceeds Standards 4	Meets Standards 3	Approaches Standard 2	Does Not Meet Standard 1
4a Knowledge of adolescent learning, development, and behavior and foster positive disposition toward mathematics	Lessons are designed to demonstrate exceptional knowledge of fostering a productive mathematics-learning environment according to the	Lessons are designed to demonstrate proficient knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that	Lessons are designed to demonstrate developing knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that	Lessons are not designed to demonstrate knowledge of fostering a productive mathematics-learning environment. Students are not engaged in activities that address

learning	standard.	address the indicator.	address the indicator.	the indicator.
4b  Developmentally appropriate, sequential, and challenging learning opportunities	Lessons are designed to demonstrate exceptional knowledge of fostering a productive mathematics-learning environment according to the standard.	Lessons are designed to demonstrate proficient knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator	Lessons are designed to demonstrate developing knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator.	Lessons are not designed to demonstrate knowledge of fostering a productive mathematics-learning environment. Students are not engaged in activities that address the indicator.
4c  Knowledge of individual differences, including cultural and language diversity	Lessons are designed to demonstrate exceptional knowledge of fostering a productive mathematics-learning environment according to the standard.	Lessons are designed to demonstrate proficient knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator	Lessons are designed to demonstrate developing knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator.	Lessons are not designed to demonstrate knowledge of fostering a productive mathematics-learning environment. Students are not engaged in activities that address the indicator.
4e  Use of tools (e.g., manipulatives, physical models, drawings, and mathematics specific technologies) to enhance teaching and learning	Lessons are designed to demonstrate exceptional knowledge of fostering a productive mathematics-learning environment according to the standard.	Lessons are designed to demonstrate proficient knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator	Lessons are designed to demonstrate developing knowledge of fostering a productive mathematics-learning environment. Students are somewhat engaged in activities that address the indicator.	Lessons are not designed to demonstrate knowledge of fostering a productive mathematics-learning environment. Students are not engaged in activities that address the indicator.

## **IMPORTANT INFORMATION FOR LICENSURE COMPLETION**

### Student Clinical Practice: Internship Requirements

#### **Testing**

Beginning with Spring 2015 internships, **all** official and passing test scores must be submitted and in the Mason system (i.e. Banner/PatriotWeb) by the internship application deadline. Allow a minimum of six weeks for official test scores to arrive at Mason. Testing too close to the application deadline means scores will not arrive in time and the internship application will not be accepted.

#### **Required tests:**

- Praxis Core Academic Skills for Educators Tests (or qualifying substitute)
- VCLA
- Praxis II (Content Knowledge exam in your specific endorsement area)

For details, please check <http://cehd.gmu.edu/teacher/test/>

#### **Endorsements**

Please note that ALL endorsement coursework must be completed, with all transcripts submitted and approved by the CEHD Endorsement Office, prior to the internship application deadline. Since the internship application must be submitted in the semester prior to the actual internship, please make an appointment to meet with the Endorsement Specialist and plan the completion of your Endorsements accordingly.

#### **CPR/AED/First Aid**

Beginning with spring 2015 internships, verification that the Emergency First Aid, CPR, and Use of AED Certification or Training requirement must be submitted and in the Mason system (i.e. Banner/PatriotWeb) by the application deadline. Students must submit one of the "acceptable evidence" documents listed at <http://cehd.gmu.edu/teacher/emergency-first-aid> to CEHD Student and Academic Affairs. In order to have the requirement reflected as met in the Mason system, documents can be scanned/e-mailed to [CEHDacad@gmu.edu](mailto:CEHDacad@gmu.edu) or dropped-off in Thompson Hall, Suite 2300.

## **Background Checks/Fingerprints**

All local school systems require students to complete a criminal background check through their human resources office (not through George Mason University) **prior to beginning the internship**. Detailed instructions on the process will be sent to the student from either the school system or Mason. Students are **strongly advised** to disclose any/all legal incidents that may appear on their records. The consequence of failing to do so, whether or not such incidents resulted in conviction, is termination of the internship.

### **Please Note**

Your G-Number must be clearly noted (visible and legible) on the face of the document(s) that you submit.

### **Application**

The internship application can be downloaded at <http://cehd.gmu.edu/teacher/internships-field-experience>

### **Deadlines**

Spring internship application:

- Traditional: September 15
- On-the Job: November 1

Fall internship application:

- Traditional: February 15
- On-the Job: May 1