EDU518: Instructional Methods for Secondary Mathematics

Syllabus

Course Description

This course will provide candidates the opportunity to explore research-based strategies for teaching secondary mathematics (middle school and high school, grades six through twelve) in alignment with the Common Core State Standards and the Colorado Academic standards and findings from the National Mathematics Advisory Panel. Best practices in assessing student learning will also be explored. By using standards as a key resource, there is a strong focus on the essential topics of secondary mathematics, including numbers and operations, algebra, geometry, measurement, and data analysis. This course combines secondary mathematics content with mathematics methods in a coordinated way through the completion of a Teacher Work Sample.

In the course project, Mathematics Teacher Work Sample: Supporting Student Learning, candidates will develop and implement a Teacher Work Sample. Candidates choose an important math skill or concept, implement a valid and reliable pre-test, analyze the results, design and implement a mathematics lesson, evaluate student learning, implement a post test, analyze the results, and reflect on the experience with his/her mentor, thereby being individually accountable for improving his/her instructional skills.

Field-Based Experience Requirement (50 Hours)

This course requires a Level 1 field-based experience ("clinical practice"), that is, activities that take place under the supervision of a mentor (e.g., a licensed teacher, school principal, other licensed educator) in an approved public K-12 school/district setting.

Candidates are required to engage in clinical practice for a minimum of **50 hours** over the eight-week span of this course (an average of 6.25 hours per week for 8 weeks). While certain activities are specified by assignments in this course, it is not expected that these required activities will consume all hours of work in the field.

All JIU clinical practice courses culminate in the mentor completing and submitting a formal **Mentor Appraisal** on the candidate. This is an *essential requirement* of this course and candidates must ensure that their mentors complete and submit a Mentor Appraisal to pass this course.

For details on the Mentor Appraisal, see the Assessment tab on the Project page. Access the Project page via the Project tab on the upper right of this course.

Candidates must also complete the **Candidate Evaluation of Clinical Practice Mentor,** an online survey evaluating their mentor, in Module 4.

For more information about courses that require field-based experiences and mentors, please contact your Student Support Counselor.

Course Learning Objectives

Upon successful completion of this course, each student/candidate will:

- Design and implement a mathematics teacher work sample that includes standards alignment, assessment, and lesson development.
- Collaborate with a mentor to complete the school-based teacher work sample.
- Demonstrate knowledge of national and state mathematics standards and incorporate standards into classroom instruction.
- Select, create and use formal and informal assessments, administer assessments, and use results to design learning objectives and identify teaching strategies and instructional materials.
- Demonstrate an understanding of formal and informal assessment types identify the advantages, disadvantages, limitations, and developmental appropriateness of each type.
- Use technology to efficiently collect, report, and use assessment data.
- Use formal and informal assessment data to monitor learning and strengthen instruction.
- Collaborate with colleagues and conduct research about instructional materials, teaching strategies, and technological resources to develop students' critical thinking, problem solving, and performance skills.
- Demonstrate knowledge of the principals, techniques, limitations, advantages of strategies to improve the cognitive processes associated with various kinds of learning.
- Facilitate student use of a variety of strategies to solve problems and monitor and reflect on problem-solving methods.
- Facilitate student ability to recognize the importance of reasoning and investigation related to mathematical conjectures and proofs.

- Facilitate student ability to use mathematical language to communicate concepts orally and in writing.
- Facilitate student ability to make connections among mathematical ideas and to real-life contexts outside of mathematics.
- Create a lesson that includes student use of mental mathematics and technology tools.
- Facilitate the development of student understanding, use, and communication of number systems and number sense, geometry, measurement, statistics and probability, and functions and use of variables.

Required Materials

Texts

Seeley, C. L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions.

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

NOTE: The APA Publication Manual is a required resource that you will use throughout your degree program. It is listed as a required text in all JIU courses. You only need to purchase it once.

JIU Library Readings

This course includes readings from electronic textbooks and/or journal articles available through the JIU Library. These resources are available free of charge and you will access them from the Readings page in each module.

Web-based Readings

This course includes required online readings. You will access them from links within each module where they are assigned. A complete list of required online readings is included on the Readings page in each module.

JIU Technology Requirements

JIU Browser Checker - An easy way to check your browser and plug-ins is to use the JIU Browser Checker, a web-based application that automatically checks to determine whether your browser and plugins meet the requirements for JIU courses.

	Minimum:	Recommended:
Operating System	Windows XP or Mac OSX	
RAM	• 500 MB of RAM	• 1 GB of RAM or above
Storage	• 4 GB or better	• 4 GB or better
Monitor	• 15" VGA • High color (16 bit) • 1024 X 768 Resolution	• 17" SVGA Monitor • True color (24 bit) • 1024 X 768 resolution or higher
Internet Connection	• 56K Modem	• Broadband
Browser (only 1 needed)*	• Internet Explorer 8.0 (PC) • Firefox 4.0 (PC and Mac)	• Internet Explorer 8.0 (PC) • Firefox 4.0 (PC and Mac)
Software	• Microsoft Office 2003 or newer	• Microsoft Office 2003 or newer
Plugins	• Adobe Acrobat Reader • Macromedia Flash Player	• Adobe Acrobat Reader • Macromedia Flash Player
Peripherals	• CD-ROM • Sound Card • Printer	• CD-ROM • Sound Card • Printer • USB Port • Webcam • Microphone, speakers, headset
Browser Settings	• Cookies must be allowed in your browser	• Cookies must be allowed in your browser

Help Desk

For the following issues, you should first contact Technical Support:

- Server issues (site not available, server is slow)
- Course access (login problems, course not available)
- Technical problems (forum malfunctioning, any course delivery software function not working properly)

Contact Information:

- Toll-Free from U.S. and Canada: 1.800.811.5663 Option 7
- International Calls: 1.303.784.8904
- Online Help

Diversity Policy

JIU professors seek and value the active participation of all students. Professors value diversity in students' ideas, viewpoints, perspectives, values, religious beliefs, backgrounds, race, gender, age, sexual orientation, human capacity, ethnicity, etc. Importantly, JIU professors respect students' diverse talents and ways of learning and provide flexibility by offering students multiple pathways to success. Professors encourage students to choose deliverables–in pursuit of learning objectives–that are personally and professionally meaningful.

Disability Services

Any student who feels s/he may need an accommodation based on the impact of a disability should visit the website for the Office of Disabilities Services at JIU. Here, you will find information regarding our policy and the procedure for requesting an accommodation.

Course Engagement Policy

JIU student participation in online discussions and projects are part of JIU teaching and learning models. Substantive and frequent interaction helps students to solidify and extend learning. All students are required to actively participate in and contribute to course discussions.

JIU will confirm course engagement as of the "census date." The census date is the third Sunday of a course, up to 11:59 p.m. Mountain Time. Course Engagement is determined by active participation through the course.

Students who are not actively engaged in a course by the census date will be dropped from the course and will receive a grade of NDR with a 100% tuition refund for that course. The course will not count as an attempted course.

Please review the course engagement policy in the JIU Student Handbook for details.

Academic Honor Statement

All JIU students are expected to adhere to the JIU Academic Honor Statement, which states:

In accordance with the JIU "Academic Code of Conduct" (found in the Student Handbook), I am solely responsible for all of my assignments (unless the assignment specifically allowed me to work with others). I have not plagiarized (represented the work of another as my own), nor have I violated copyright or other applicable U.S. laws. JIU holds that the respect for ideas and intellectual property rights is a critical value in academic communities. As a member of this community, I share responsibility in ensuring that the authentic expression of ideas is observed.

Total Professional Advantage 2.0®

JIU´s institutional learning objectives require all JIU students to "design a personal and professional development strategy to formulate a pathway leading to future success."

To that end, JIU has created a customized career development portal and program: Total Professional Advantage® 2.0 (TPA® 2.0).

TPA 2.0 provides an array of free career development resources, including an electronic portfolio and interactive workshops.

We strongly encourage you to engage in TPA 2.0 *early* in your academic program. Access TPA 2.0 via the link near the top of your "My Courses" page.

TurnItIn.com

The academic leaders at Jones International University recognize that some students experience challenges when working to properly cite sources within their papers and projects.

To ensure that every student gives proper credit to a work's original author and to prevent plagiarism, JIU has contracted with TurnItIn.com® to provide students and professors with access to its "Originality Checking" software. From this point forward, students may submit assignments for every course to TurnItIn for a quality check, and then correct errors prior to submitting assignments to their professors. Students are especially encouraged to use TurnItIn prior to submitting their final projects and papers in every course.

Please note:

- TurnItIn does not check the correctness of a student's citations. The TurnItIn report only indicates that a section of text is found in another source. It is each student's responsibility to make certain s/he has properly cited others' works.

- Every student must follow APA guidelines when citing sources. Students who are unsure about APA formatting should use the numerous free resources available to them in the Resources section in JIU's courses.

- Your instructor will provide details on how to access TurnItIn.com.

Course Structure

This course consists of the eight modules outlined below:

Module 1: Current Math Standards and Reports

This module will introduce *standards* as a way to ground your thinking about teaching mathematics in the elementary classroom. You will read the basic documents that guide school mathematics today: the National Council of Teachers of Mathematics (NCTM) Principles and Standards, The Final Report of the National Mathematics Advisory Panel, the Common Core State Standards for Mathematics, and the Colorado Academic Standards. Through these readings, you'll find that mathematics is more than arithmetic; and in your first Forum discussion, you'll explain why.

Module 2: The Standards and Beyond

In this module, you will take a deeper look at the Common Core State Standards Initiative and Colorado mathematics standards. You will read about the rationale and strategies for incorporating manipulatives, writing in mathematics and teaching mathematics vocabulary. The Colorado Academic Standards provide examples for real-world applications in the "Relevance and Application" section. You will also align the mathematics topics you selected for your lesson to either the Common Core State Standards or Colorado standards; and identify how you will include problem solving, writing, real-world applications, and manipulatives and technology.

Module 3: Assessing Mathematical Understanding- Pre-Assessment I

In this module, you will be introduced to the concepts of formal and informal assessments, and compare their purposes and forms. You will also get acquainted with professionally developed assessments: National Assessment of Educational Progress (NAEP), AimsWeb, Northwest Evaluation Association (NWEA) Assessments and Scantron Achievement Series Assessments.

Module 4: Assessing Mathematical Understanding-Pre-Assessment II

In this module, you will pre-assess your students using the instrument you selected or created in Module 3. After you assess, you will collect, analyze, summarize and display your pre-assessment data. You will also reflect on the pre-assessment instrument, administration, scoring process and results.

Module 5: Creating Lesson Plans

In this module, you will create a lesson plan for the mathematics skills and concepts you selected in Module 2 and pre-assessed in Module 4. The lesson plan must embrace all learners and incorporate problem solving, critical thinking, mathematical vocabulary and symbols, and include resources such as technology and manipulatives. We'll spend some time exploring the diversity you can expect to find in your classroom and discuss the different resources available to you to help you reach all learners and incorporate all facets of mathematics.

Module 6: Problem Solving Strategies and Lesson Implementation

In this module, you will implement the lesson plan you developed in Module 5, carefully documenting and reflecting on the process using the JIU post-lesson observation form immediately after you teach the lesson.

Module 7: Assessing Mathematical Understanding (Post-Assessment)

In this module, you will assess your students using the instrument you used in Module 3 (or a parallel form of the instrument). After you assess, you will collect, analyze, summarize and display your post-assessment data, and compare it to your pre-assessment data. This module is also about connections — connections between "school math" and the real world and connections between the different branches of the elementary mathematics curriculum. You'll be making these connections by creating enrichments for your lesson. You'll also learn about the power of mental math and some of the more fundamental techniques.

Module 8: Wrapping it Up

In this module, you will pull your entire project together, using previous suggestions from your instructor, your classmates and new knowledge gained throughout the course. In addition, you will experiment with technology tools for assessment, explore the World Wide Web for teaching resources and reflect on what it means to be a lifelong learner in the education profession.

Assignments Overview

Two types of assignments will be submitted to the instructor for grading:

Forum Discussions

Students engage in ongoing professional discussions with peers in the program about their professional reading, professional development and professional projects. A successful discussion includes the following distinguishing features. The student:

- Clearly demonstrates introspection and synthesis of ideas
- Clearly demonstrates relevance to readings and class discussions
- Clearly demonstrates a deep understanding of course content
- Clearly and persuasively expresses opinions
- Uses professional language
- Uses proper grammar and punctuation
- Adheres to JIU Rules of Netiquette
- Posts often throughout the week period
- Engages participants in dialogue
- Clearly offers insightful comments or questions that build on comments from peers
- Advances the discussion in a meaningful and significant way Responds to all questions
- Is graceful, polite and professional when disagreeing with a peer
- Clearly demonstrates mature critical thinking
- Clearly makes arguments that are relevant, focused, logical and well-supported
- Cites relevant resources (readings, module content and personal experience) with appropriate detail
- Clearly provides concrete examples from own experience to support opinions

Project Elements

These course project components will be compiled throughout the course to create the final course project: *Mathematics Teacher Work Sample: Supporting Student Learning*.

It should be carefully noted and considered by the student in preparing assignments that a critical factor in grading assignments is *reference to readings*. In preparing papers, students should cite readings in order to support the premise of the assignment, and to show the instructor that the readings have been done and understood.

Course at a Glance

Module 1: Current Math Standards and Reports

Required Readings

ey, C. L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions Publications. [Text]

Message 4: Good Old Days

Department of Education. (2008). The final report of the national mathematics advisory panel. [Web]

Executive Summary, pp. xi-xxvii

ghnessy, J.M. (2011). CCSSM and curriculum and assessment: NOT business as usual. National Council of Teachers of Mathematics. [Web]

mon Core Standards Initiative. (2010). Common core state standards in mathematics. [Web]

pp. 3-4

rado Department of Education. (2010).Colorado P-12 academic standards: Mathematics. [Web]

Assignments

- Assignment 1.1: Mentor Information and School Demographics 10
- Assignment 1.2: Forum Discussion: Why Standards? 40
- Assignment 1.3: Course Project: Demographics 20

Module 2: The Standards and Beyond

Required Readings

ey, C. L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions.

Message 5: Technology is a tool

Message 20: Putting calculators in their place

Message 30: Crystal's calculator

Message 33: Engaged in what?

denburg, M.L. (2002). Advanced math? Write! *Educational Leadership 60*(3). [Jones e-global libraryÂ®: EBSCO]

pp. 67-68

s, M. 2006. Marilyn Burns on the language of math. *Instructor, 115* (7). [Jones e-global libraryÂ®: EBSCO]

pp. 41-43

mon Core Standards Initiative. (2010). Common core state standards in mathematics. [Web]

p. 5, and the standards related to the skills and concepts for your project

rado Department of Education. (2010). Colorado P-12 academic standards: Mathematics.. [Web]

pp. 11-13 (the page numbers at the bottom of the page in the document), and the standards related to the skills and concepts for your project

nal Council of Teachers of Mathematics. (2005). Computation, calculators, and common sense. [Web]

nal Council of Teachers of Mathematics. (2008). The role of technology in the teaching and learning of mathematics. [Web]

Department of Education. (2008). The final report of the national mathematics advisory panel. [Web]

Chapter 7, pp. 49-51

Assignments

- Assignment 2.1: Forum Discussion: Compare and Contrast Features of Common Core and State Standards 40
- Assignment 2.2: Course Project: Align Math Concepts and/or Skills with Standards 50
- Assignment 2.3: Reflective Journal 1 20

Module 3: Assessing Mathematical Understanding- Pre-Assessment I

Required Readings

ey, C. L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions. [Text]

Message 36: I Know What an 82 Means!

ORE, PLAN, AND ACT (2011). [Web]

Department of Education. (2008). The final report of the National Mathematics Advisory Panel. [Web]

Chapter 7, pp. 46-49; Chapter 9, pp. 57-61

nal Assessment of Educational Progress. (NAEP). [Web]

Explore Grade 8 and Grade 12 Results and Test Items

nwest Evaluation Association Assessments. MAP Basics Overview. [Web]

Assignments

- Assignment 3.1: Forum Discussion: Features of High-Quality Assessments Reflection 40
- Assignment 3.2: Course Project: Pre-Assessment Plan 50

Module 4: Assessing Mathematical Understanding-Pre-Assessment II

Required Readings

ey, C.L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions Publications. [Text]

Message 1: Math for a Flattening World

Message 6: “Teach Harder!” Isn't the Answer

Message 14: Balance is Basic

Message 22: We Don't Care About the Answer; Yes We Do. Looking for Balance

n, A. (2001). Math wars. *NEA Today, 19*(8). [Jones e-global library®: EBSCO]

Assignments

- Assignment 4.1: Forum Discussion: Reform vs Traditional Mathematics Curriculum 40
- Assignment 4.2: Course Project: Pre-Assessment Data Analysis 50
- Assignment 4.3: Reflective Journal 2 20

Module 5: Creating Lesson Plans

Required Readings

ey, C.L. (2009). *Faster isn't smarter.*. Sausalito, CA: Math Solutions Publications. [Text]

Message 2: Untapped Potential

Message 17: Constructive Struggling

Message 32: Yes, but...Believing in Every Student

Message 2: Boring! Is Keeping Students Interested a Teacher's Job?

mon Core Standards Initiative. (2010). Common Core State Standards in Mathematics. [Web]

Standards related to your project

rado Department of Education. (2010).Colorado P-12 academic standards: Mathematics. [Web]

Standards related to your project

onal Council of Teachers of Mathematics. (2005). Computation, calculators, and common sense. [Web]

onal Council of Teachers of Mathematics. (2005). Closing the achievement gap. [Web]

onal Council of Teachers of Mathematics. (2008). The role of technology in the teaching and learning of mathematics. [Web]

onal Council of Teachers of Mathematics. (2008). Teaching mathematics to English language learners. [Web]

Assignments

- Assignment 5.1: Forum Discussion: Conjecture and Proof Reflection 40
- Assignment 5.2: Course Project: Lesson Plan 50

Module 6: Problem Solving Strategies and Lesson Implementation

Required Readings

ey, C.L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions Publications. v

Message 6: Making the Case for Creativity

Message 15: Less Can Be More

Message 26: Beyond Pockets of Wonderfulness

Message 29: The Evolution of a Mathematics Teacher

ɔnal Council of Teachers of Mathematics (n.d.). *Reflection improves instruction.* [Web]

ɹ, C. B., Stone, B., Hubbell, E., & Pitler, H. (2012). *Classroom instruction that works: Research-based strategies for increasing student achievement* (2nd ed.). Alexandria, VA: ASCD. [Web]

Introduction: Instruction that makes a difference

Assignments

- Assignment 6.1: Forum Discussion: Problem-Solving Strategies Reflection 40
- Assignment 6.2: Course Project: Lesson Reflection 50
- Assignment 6.3: Reflective Journal 3 20

Module 7: Assessing Mathematical Understanding (Post-Assessment)

Required Readings

ɐy, C.L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions Publications. [Text]

Message 7: Not Your Grandpa's Algebra

Message 21: No More Pilgrim Pie

Message 24: Do It In Your Head

Message 34: Forgetting Isn't Forever

ɔnal Council of Teachers of Mathematics. (n.d.). *Principles and standards for school mathematics: Connections*. [Web]

mon Core State Standards Initiative. (2012). *Standards for Mathematical Practice*. [Web]

Assignments

- Assignment 7.1: Forum Discussion: Enriching My Lesson 40
- Assignment 7.2: Course Project: Post-Assessment Data Analysis 50

Module 8: Wrapping it Up

Required Readings

ɐy, C. L. (2009). *Faster isn't smarter*. Sausalito, CA: Math Solutions.

Message 19: Embracing Accountability

Message 28: So Now You're a Teacher

Message 29: The Evolution of a Mathematics Teacher

Message 39: Standing on the Shoulders...

ɹur, R. (2004, May). What is a professional learning community? *Educational Leadership*. [Web]

ɥoker, M. (2003). First things first: Demystifying data analysis. *Educational Leadership, 60* (5). [Jones e-global library®: EBSCO)

pp. 22-24. Department of Education. (2008). The final report of the national mathematics advisory panel. [Web] Chapter 6: Teachers and Teacher Education **Assignments** • Assignment 8.1: Data Collection, Reporting and Use • Assignment 8.2: Professional, Portfolio-Ready Mathematics Teacher Work Sample • Assignment 8.3: Reflective Journal 4	 40 270 20
Total Points Possible	1,000

Grading

Final grades for the course will be assigned based on the scale below:

Final Grade	Total Points Earned
A	900 - 1,000
B	800 - 899
C	700 - 799
U	Less than 700

Students may receive lower final grades than indicated on this scale if all required assignments are not completed and submitted.