

# Course Outline for MATH 4424, Teaching Mathematics in Secondary School

## **MATH 4424 Teaching Mathematics in Secondary School (4 units)**

Prerequisite: Admission into the Mathematics Single Subject Credential Program or consent of instructor.

Research-based methods of teaching and learning mathematics in secondary schools with an emphasis on planning instruction and designing effective assessment and learning experiences for all students. Introduction to current issues in mathematics education. For students who will be teaching in secondary schools. Credit/No Credit grading only. 4 lectures. Formerly MATH 424.

| Course Learning Objectives |                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                          | Analyze beliefs about the nature of mathematics, what it means to do mathematics, to understand mathematics, and to teach mathematics; then compare these with historical perspectives.     |
| 2                          | Discuss and apply the best practices from the professional literature and organizations pertaining to secondary school mathematics.                                                         |
| 3                          | Plan effective mathematics instruction that encourages procedural fluency, conceptual understanding, mathematical reasoning and problem solving.                                            |
| 4                          | Create lessons that support all students' mathematical academic language development.                                                                                                       |
| 5                          | Make effective lesson plans and unit plans that incorporate a range of research-based strategies to teach all students, including English language learners.                                |
| 6                          | Design student assessments that align with instructional goals and have clear criteria for student success.                                                                                 |
| 7                          | Apply the Standards for Mathematical Practice to create classroom environments that promote educational equity among diverse learners and addresses the needs of English language learners. |
| 8                          | Use assessment data to plan and inform instruction to improve student learning.                                                                                                             |

## Expanded Course Content

### Textbooks, materials, and/or other resources

Text 1. Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching by Jo Boaler (2015)

Text 2. Five Practices for Orchestrating Productive Mathematics Discussions by Margaret S. Smith and Mary K. (Kay) Stein (2nd Edition)

| Week | Readings                                                                                                                                                                                  | Topics of Discussion                                                                                                                                                                                                     |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | <p>NCTM, NCSM, &amp; ASSM (2021). Continuing the journey; mathematics learning 2021 and beyond.</p> <p>-Authenticity in the Classroom</p> <p>-Because we love (Bleiler-Baxter · 2019)</p> | <p>Intro to course and to each other.</p> <p>Building on knowledge gained from early start,</p> <p>Practicum Talk</p>                                                                                                    |
| 2    | <p>Brahier, D. (2020) Teaching Secondary and Middle School Mathematics (6ed),</p> <p>California Common Core State Standards for Mathematics (CCCSSM)</p> <p>Text 1 chapter 1-3 and 5</p>  | <p>CCCSSM and Coherence Map,</p> <p>Number Talks,</p> <p>Productive Struggles, Beliefs about Teaching of Mathematics/ Growth and Mathematical</p> <p>Mindsets,</p> <p>Mathematical Practices,</p> <p>Problem solving</p> |

| Week | Readings                                                                                                                                                                                                                                                                                                                                                                                                                          | Topics of Discussion                                                                                                                                                                                                                                                                                                                                               |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3    | <p>Relevant articles for research-based math teaching and learning theories. Ex:</p> <p>Campbell, L.; Campbell, B. (2008). Beginning with what students know: The role of prior knowledge in learning.</p> <p>Coggins, D., Kravin, D., Coates, G.D., &amp; Carroll, M.D. (2007). Scaffolding: give support for both mathematics and language learning. In English language learners in the mathematics classroom (pp. 29-40).</p> | <p>Research-based math teaching/Learning Theories in Mathematics Education.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>- Activating students' Prior Knowledge</li> <li>-Vygotsky and social-cultural theory of learning.</li> <li>- Problem Based Learning</li> <li>-Conceptual/Procedural/Problem Solving</li> <li>- Role of homework</li> </ul> |
| 4    | See readings in week 3 as examples                                                                                                                                                                                                                                                                                                                                                                                                | Research-based Teaching and Learning Theories.                                                                                                                                                                                                                                                                                                                     |
| 5    | Text 2 Introduction and chapter 1-6                                                                                                                                                                                                                                                                                                                                                                                               | <p>The 5 Practices: Anticipating, Monitoring, Selecting, Sequencing, and Connecting.</p> <p>-Mathematics Classroom Discourse</p>                                                                                                                                                                                                                                   |
| 6    | <p>Herbel-Eisenmann, B. A., &amp; Breyfogle, M. L. (2005). Questioning our patterns of questioning</p> <p>Manouchehri, A. &amp; Lapp, D. (2003). Unveiling student understanding: The role of questioning in instruction.</p>                                                                                                                                                                                                     | Questioning                                                                                                                                                                                                                                                                                                                                                        |
| 7    | <p>Text 1 chapter 6</p> <p>Ex:Bonner, E. P. (2021). Practicing culturally responsive mathematics teaching, Mathematics Teacher: Learning and Teaching PK-12, 114(1), 6-15.</p>                                                                                                                                                                                                                                                    | <p>Equity and Access in mathematics education,</p> <p>Universal Design Learning,</p> <p>Multiple Representations,</p> <p>ELL Strategies (diverse student population),</p> <p>Culturally Responsive Teaching.</p>                                                                                                                                                   |

| Week | Readings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Topics of Discussion                                                                                                                                                          |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8    | <p>Targeted readings on Literacy, dyslexia, dyscalculia and academic language Ex:</p> <p>Zwiers, J. (2008). Building academic language: essential practices for content classrooms, grades 5-12.</p> <p>edTPA documents on Academic Language</p> <p>ELD Standards</p> <p>Code Green on Dyscalculia (chapter 1-2)</p> <p>Secondary Mathematics Teachers: What They Know and Don't Know about Dyscalculia.</p> <p>Mathematics for Dyslexics and Dyscalculics: A Teaching Handbook (chapters 1-3)</p> | <p>Academic Language in the Mathematics Classroom.</p> <p>Writing and reading in the mathematics classroom.</p> <p>Dyslexia and Dyscalculia in the mathematics classroom.</p> |
| 9    | Math lesson plan Template and comments                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Planning a Lesson (incl. designing assessment) and lesson plan template.                                                                                                      |
| 10   | Current Performance-Based Assessment Handbook                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Performance-Based Assessment (PBA) and lesson plan template.                                                                                                                  |
| 11   | Current Performance-Based Assessment Handbook                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Peer feedback for lesson presentation and current performance-based assessment rubrics.                                                                                       |
| 12   | Current Performance-Based Assessment Handbook                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Peer feedback for lesson presentation and current performance-based assessment rubrics.                                                                                       |
| 13   | Current Performance-Based Assessment Handbook                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Peer feedback for lesson presentation and current performance-based assessment rubrics.                                                                                       |

| Week | Readings                                      | Topics of Discussion                                                                                             |
|------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 14   | Current Performance-Based Assessment Handbook | Analyzing student assessment for whole group and individual. How to adapt instruction given assessment analysis. |
| 15   | Current Performance-Based Assessment Handbook | Analyzing student assessment for whole group and individual. How to adapt instruction given assessment analysis. |

## Method of Assessment

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The possible methods of assessment are written individual examinations, quizzes, in-class worksheets and presentations, projects, and homework. Students will create a final unit plan consisting of 3 to 5 lesson plans developed based on the current method for final performance-based assessment (PBA) as well as assessments and corresponding rubric/grading criteria. Drafts of the lessons and assessments will be due throughout the semester and feedback will be provided.

## Instructional Mode

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The instructional mode for this class is face-to-face. This designation means that the essential academic standards of the course require in-class student engagement, and thus remote instruction is not appropriate.