

SED 4200/5210: Teaching of the Major Field: Mathematics

Develops specific knowledge, competencies and skills required for effective teaching in the student's major field. Field placement required. Prerequisite(s): admission to Secondary Education and internship placement.

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Through a lens of practice we will answer those questions and more.

1. *How do we elicit and interpret individual students' thinking?*
2. *How do we effectively explain and model content, practices, and strategies?*
3. *How do we design single lessons and sequences of lessons?*
4. *How do we select and design formal assessments of student learning?*
5. *How do I lead a group discussion?*

This methods course is designed to support the professional development of prospective middle and high school mathematics teachers about to embark on their student teaching. Mathematics is notoriously difficult for many people. It is important to consider why that is.

At the same time, success in mathematics is critical for students' future educational opportunities. The goal of the course is to help you learn to teach the content in ways that make significant mathematical ideas accessible to all students and that support students in developing *mathematical proficiency*. As defined by the National Research Council, mathematical proficiency includes both ability (e.g., to reason logically, solve non-routine problems, and communicate about mathematics) and attitude (e.g., a disposition to question and explore). In the course we will use artifacts of practice (e.g., audio and video of the teaching of expert teachers, your colleagues, and you) and approximations of practice (e.g., teaching rehearsals) to focus on five essential elements of professional teaching practice.

Rehearsals (Franke, Kazemi, & Lampert, 2009). These are brief mini-lessons that give interns the opportunity to practice a component of teaching. Students and I will frequently stop the "teacher" and have them try making different instructional decisions. This work allows interns to practice working with students to support non-traditional or idiosyncratic mathematical thinking.

High Leverage Teaching Practices (HLTPs) (Ball, Sleep, Boerst & Bass, 2009). High-leverage practices are the fundamental elements of teaching. These practices are used frequently in professional teaching and are critical to helping students learn to teach professionally. These high-leverage practices are used across subject areas, grade levels, and contexts. HLTPs can be practiced in methods classes and field placements. We will work with interns, cooperating teachers, and field supervisors around these HLTPs.

Course Expectations

Engagement: A class is a learning community. It requires effort on the part of all involved. Please ask questions during class, work on tasks and problems posed, and generally be mindful of the obligations of each of us to generate and sustain opportunities to learn. Class sessions will consist of three main types of activities: discussions of readings/videos/activities; your teaching rehearsals; and critiques of teaching artifacts. Your full

participation in all activities is essential for our class to learn more deeply together. Being on time, being prepared, and being considerate contribute to good citizenship. Your attendance and full participation are required during each class session. If for some reason you cannot attend a class session, please contact me as soon as possible. We will confer with you about whether and how you can make up the work you have missed.

Classroom Assignments: You will often be asked to complete short assignments for class sessions. These assignments will be diverse, and may include watching a video, analyzing student work, or preparing activities. Completing these assignments, like completing readings, is a critical part of your coursework. These assignments are not necessarily noted on this syllabus, as they will be determined week-to-week, based on what happens in class sessions (typically motivated by the HLTP we are practicing and student needs). In addition, for each reading I will post a question for you to respond to in no more than one paragraph. These responses should be submitted 24 hours before class.

High Leverage Teaching Practices: High Leverage Teaching Practices (HLTPs) instructional tasks will be previewed on STEP Wednesdays as well as in your methods class. These will be submitted biweekly (every two weeks). You will not receive a letter grade for these HLTPs; each HLTP is graded Pass/Fail. However, you will receive feedback (in and/or out of class) on your HLTPs from both your methods instructor and your field supervisor. Feedback will also be given collaboratively during your methods course. Because these HLTPs are a centerpiece of this methods course (as well as the STEP program), their quality submission will count for 70% of your course grade.

Methods Assignments (Graded)

Because SED 4200/5210 is a licensure course, a minimum proficiency expectation applies to all formal course assignments. Unless otherwise noted, I will grade all assignments on an A-B-Revise scale. Any work that doesn't meet minimum proficiency requirements (i.e., that doesn't receive a grade of B- or higher) must be revised after a conference between the student and instructor. Detailed descriptions of all written assignments will be distributed and/or discussed in class.

ASSIGNMENTS

Engagement includes: punctuality and attendance; careful preparation of course readings and daily assignments; and active and considerate participation in class activities. In addition, students may be selected to demonstrate particular components of practice (that have been planned) in front of the class.

HLTP Assessments: When you are a professional teacher (1-year from our first class), you will be observed by your building administrator approximately 5 times. In this methods class, you will be assessed for most HLTPs twice during the semester. This will enable you to make an argument about your growth. These assessments are informal, but will help provide evidence for your licensure (along with much other evidence). You will be given a week to prepare for these assessments. You can think of these assessments as opportunities to rehearse complex elements of teaching in the classroom.

Instructional Design: In this course, we take a bottom-up approach to instructional design and enactment (the two are inseparable). This design and enactment progressively develop across space and time. For instance, we begin by considering (1) the individual learner (across a span of 15 minutes), (2) teaching to individual small groups (across 15-30 minutes), (3) facilitating single activities with the entire class (across 15-30 minutes), (4) facilitating multiple activities with the entire class (across a class period), and (5) facilitating multiple activities

with the entire class (across multiple class periods). We will develop along this trajectory the entire semester (and to some extent during your student teaching). Here are the instructional design and enactment assignments for which you will be responsible:

1. Lesson Plan, one activity
2. Lesson Plan, one day
3. Lesson Plan, one week

However, please keep in mind that this methods class is principally focused on supporting and developing HLTPs. Thus, you will not be writing 30-page lesson plans. For the most part, you will not turn in more than 2 or 3 pages for any lesson or activity design for this class.

Student-Teacher Lab: Every week, one student will teach a 15-minute lesson (timed). Throughout the semester, no matter how much responsibility you have taken on in your classroom, you will have opportunities to teach the lessons that are being taught at that time in the semester. You will be given feedback by the teacher.

SED 4200/5210: Mathematics Assignments	% Of Final Grade
Engagement/Participation/Attendance	10
HLTPs	75
Student-Teacher Lab (in class)	10
Instructional Design (throughout the course)	5

Your course letter grade will be determined based on the number of points you earn. The table below shows which grade letter you will receive based on your total points. If you do all the work, you will receive all the points. I know how exhausting and overwhelming student-teaching can be. This class is not designed to further stress you out. It is designed to have you practice and develop necessary elements of teaching so you will be able to start your second semester and your professional career as an expert novice.

Letter Grade	Points
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0

C-	1.7
D+	1.3
D	1.0
F	0.0

Readings

Graduate (masters) students will also be required to create an annotated bibliography of the readings we do in class. The purpose of this is to help graduate students with their capstone requirement. The bibliography will (minimally) take the form of a list of citations (APA style, as in the syllabus—you can cut and paste) with page-indexed notes in the following categories for each reading: Main Points, Ideas Interesting Enough to Re-Use (indexed by page), Criticisms. This annotated bibliography will be due (drop box) by the beginning of class on November 29. You should do these annotations incrementally, as we discuss the readings, rather than waiting until the end of the semester. Masters students will also have some additional requirements for your teachable cases.

All texts in this course will be disseminated electronically.

Required: Horn, I.S. (2012). *Strength in Numbers: Collaborative Learning in the Secondary Classroom*. Reston, VA: National Council of Teachers of Mathematics.

All readings are required unless otherwise specified. The goal when reading is to identify two or three observations that can lead to substantive discussions, especially by connecting with prior discussions and readings. Please be prepared to share your responses to guiding questions when those are provided. I expect you to come to class having completed the readings and prepared to participate actively in class discussions of them.

More than two absences will result in a 2.5% decrease in your grade for the course.

Academic Honesty: The penalty for cheating is a grade of 0.0 in the course in addition to any penalty imposed by the University Academic Conduct Committee.

This syllabus is subject to change.

Schedule

1. Wednesday, September 5

Course Introduction

HLTP: Explaining and Modeling Content, Practices, and Strategies

Working with Rubrics and Observation Forms

Read: How Students Learn (Introduction, Chapter 5); Strength in Numbers (Introduction)

2. Wednesday, September 12

HLTP: Explaining and Modeling Content, Practices, and Strategies

Working with Rubrics and Observation Forms

Instructional Design: Stage 1a

Strength in Numbers (Chapter 1)

3. Wednesday, September 19

HLTP: Explaining and Modeling Content, Practices, and Strategies

Student-teacher Lab

4. Wednesday, September 26

HLTP: Appraising, Choosing, and Modifying Tasks and Texts for a Specific Learning Goal

Student-teacher Lab

Status and Mathematical Competence

Read: Horn (Chapter 2-3)

WIT 1 Due

5. Wednesday, October 3

HLTP: Appraising, Choosing, and Modifying Tasks and Texts for a Specific Learning Goal

Student-teacher Lab

Groupworthy Tasks & Positive Interdependence

Read: Horn (Chapter 4-5)

6. Wednesday, October 10

HLTP: Eliciting and interpreting individual students' thinking

Student-teacher Lab

Designing for Group Work: No Teacher Alone Is as Smart as All of Us Together

Read: Horn (Chapter 5-6)

WIT 2 Due

7. Wednesday, October 17

HLTP: Eliciting and interpreting individual students' thinking

Student-teacher Lab

Read: Horn (Chapter 7-8)

GLT1

8. Wednesday, October 24

Student-teacher Lab

GLT1

Discourse

Read: Chapin, O'Connor, and Anderson (Chapter TBD)

9. Wednesday, October 31

Student-teacher Lab

HLTP: Selecting and designing formal assessments of student learning

Read: Lehrer & Lesh?

Due: GLT 1

10. Wednesday, November 7

Student-teacher Lab

HLTP: Selecting and designing formal assessments of student learning

What Can('t) You Plan For?

Plan: Lesson Plan (One Day)

11. Wednesday, November 14

HLTP: Classroom Discussion

Student-teacher Lab

Equitable Mathematics Teaching Revisited

Due: WIT 4

12. Wednesday, November 21

HLTP: Classroom Discussion

Student-teacher Lab

Disciplinary Practices

GLT 2

13. Wednesday, November 28

Student-teacher Lab

GLT 2

Due: WIT 5

14. Final TBD

Juried Teaching Workshop?

Due: GLT 2

Bibliography (Subject to Change)

- Aguirre, J. & Bunch, G. (2012). What's language got to do with it? Identifying language demands in mathematics instruction for English language learners. . In S. Celedón-Pattichis and N. G. Ramirez (Eds.) *Beyond good teaching: Advancing mathematics education for ELLs*. Reston, VA: NCTM, pp. 183-194.
- Boaler, J. & Humphreys, C. (2005). *Connecting mathematical ideas: Middle school video cases to support teaching and learning*. Portsmouth, NH: Heinemann. [Chapter 1: Opening the Door to My Classroom; Chapter 2: Building on Student Ideas: The Border Problem, Part 1 (March 9th); Chapter 3: Building Understanding of Algebraic Representation: The Border Problem, Part 2 (March 12th)]
- Brown, R. G., Dolciani, M. P., Sorgenfrey, R. H., & Cole, W. L. (2000). *Algebra: Structure and Method, Book 1*. Evanston, IL: Houghton Mifflin. [Chapter 12: Quadratic Functions.]
- Chapin, S. H., O'Connor, C., & Anderson, N. C. (2003). *Classroom discussions: Using math talk to help students learn, grades 1–6*. Sausalito, CA: Math Solutions. [Chapter 2: 11-42]
- The Common Core Standards: <http://www.corestandards.org/the-standards/mathematics/>
- Dietiker, L., Kysh, J., Sallee, T., Hoey, B. (2005). *Algebra Connections*. Sacramento, CA: CPM Educational Program. [Chapter 8: Quadratics]
- Driscoll, M. (1999). *Fostering algebraic thinking: A guide for teachers grades 6-10*. Portsmouth, NH: Heinemann. [Chapter 1: Developing Algebraic Habits of Mind; Chapter 4: Expressing generalizations about structure.]
- Fendel, D. & Resek, D. (1999) *Interactive Mathematics Program*. Emeryville, CA: Key Curriculum Press. [Year 3: Fireworks]
- Henningsen, M. & Stein, M. K. (2002). Supporting students' high-level thinking, reasoning, and communication in mathematics. In J. Sowder & B. Schappelle (Eds.), *Lessons learned from research* (pp. 27-35). Reston, VA: National Council of Teachers of Mathematics.
- Horn, I.S. (2012). *Strength in Numbers: Collaborative Learning in the Secondary Classroom*. Reston, VA: National Council of Teachers of Mathematics.
- Hyde, A. (2009). *Understanding middle school math: Cool problems to get students thinking and connecting*. Portsmouth, NH: Heinemann. [Chapter 4: Algebraic Thinking and Modeling]
- Kersaint, G., Thompson, D. R., & Petkova, M. (2008). *Teaching mathematics to English language learners*. New York: Routledge. [2.3: The Nature of Mathematics Language (46 – 52)]
- Kitchen, R., Burr, L. Libni, B.C., Fernandes, A., Martinello, M. & Wolf, M.K. (2012). Cases of practice: Assessing ELLs in mathematics. In S. Celedón-Pattichis and N. G. Ramirez (Eds.) *Beyond good teaching: Advancing mathematics education for ELLs*. Reston, VA: NCTM, pp. 139-162.
- Lappan, G., Fey, J. T., Fitzgerald, W. M., Friel, S. N., & Phillips, E. D. (2009). *Connected Mathematics Project 2*. Boston: Pearson. [Frogs, Fleas, and Painted Cubes: Quadratic Relationships]

- Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. (2005). *Algebra I*. Evanston, IL: McDougal Littell. [Chapter 9: Quadratic Equations and Functions.]
- Ma, L. (1999). Generating representations: Division by fractions. In *Knowing and teaching elementary mathematics: teachers' understanding of fundamental mathematics in China and the United States*. Mahwah, NJ: Lawrence Erlbaum. [Chapter 3: pp. 55 – 83]
- National Research Council (2001). *Adding it up: Helping children learn mathematics*. J. Kilpatrick, J. Swafford, and B. Findell (Eds.). Mathematics Learning Study Committee. Washington, DC: National Academy Press. (Chapter 4: pp. 115-145).
- Smith, M.S. & Stein, M.K. (1998). Selecting and creating mathematical tasks: From research to practice. *Mathematics teaching in the middle school*, 3(5), pp. 344-350.
- Stein, M. K., Engle, R. A., Smith, P. S., & Hughes, E. K. (2008). Orchestrating productive mathematical discussions: Five practices for helping teachers move beyond show and tell. *Mathematical Thinking and Learning*, 10(4), 313–340.
- Taylor, C.S. & Nolen, S.B. (2008). *Classroom assessment: Supporting teaching and learning in real classrooms*. Upper Saddle River, NJ: Pearson Education Inc.
- Winsor, M.S. (2007/2008). Bridging the language barrier in mathematics teaching. *Mathematics Teaching in the Middle School*, 101(5), pp. 372-378.