

Education 263C: Curriculum & Instruction in Mathematics, Winter 2009
Building 200, Room 219. Tuesdays, 3:15 – 6:05pm

Megan W. Taylor
ilovemath@mac.com
Office: CERAS 217
(415) 999-5827

Kristina Dance
kristinadance@gmail.com

Angelita Garcia-Stonehocker
quitzia@stanfordalumni.org

Introduction

This is the third of a 3-course sequence focused on mathematics teaching and learning. The course sequence is designed to create an opportunity for sustained learning and professional growth. Our goals for the year are to help you...

- increase your knowledge of mathematics and mathematics pedagogy
- examine your own knowledge, beliefs, and assumptions about mathematics, teaching and students
- increase your theoretical knowledge and practical experiences in planning, teaching, and assessing mathematics
- understand the mathematical needs of a diverse range of students
- understand the complexities of diverse, multi-ability classrooms while broadening your repertoire of teaching strategies
- learn from your experiences in schools through informed reflection

This quarter we will continue to develop skills in lesson planning, but will focus more on how particular lessons fit into larger instructional unit plans, spanning several weeks. We will draw on what we have learned about developing clearly-articulated learning goals for students, selecting and implementing tasks, choosing participation structures, and using both formative and summative assessment strategies. We will continue to discuss approaches to backwards design (Wiggins & McTighe, 2005), but as applied to curricular units instead of just individual lessons. The experience of developing and refining a unit of instruction is the cornerstone of our work this quarter, and it will prepare you for success on the PACT, the culminating performance assessment of your teaching proficiency in the spring. You will submit pieces of this unit often this quarter to either an instructor or a peer review partner, and there will be frequent chunks of class time dedicated to workshopping its parts.

This quarter we will discuss in detail the role of context and discourse in mathematics education, and explore new activity structures and tasks. Additionally, to expand your teaching repertoire in serving students with a range of proficiencies, we will examine instructional resources including manipulatives and technologies such as dynamic software and graphing calculators.

As this is our final quarter together, we will take some time to look both backwards and forwards, particularly in the last session. We will provide you with opportunities to reflect on your own growth throughout the year and to look forward to your entering the teaching profession by considering ways to continue to learn from your own practice and from that of your peers.

Course Requirements

We expect you to come to class having completed the reading and assignments due for that day and prepared to participate in class discussions and activities. Some weeks this quarter we will be reading each other's work in lieu of formal articles. With the exception of those weeks (noted in this syllabus), weekly reaction papers should be posted to BlackBoard by the Sunday night before the class the readings are due. The guidelines for these reaction papers are identical to those from fall quarter. Attendance to all sessions is mandatory. Please give us ample heads up if you must be late to or miss a class.

Assignments:

- **3 Reading Reaction Papers - DUE Sunday, 1/11, 2/1 and 2/15**
- **Elaborated Lesson Plan Assignment, Part II – DUE Monday, February 2**
- **Unit Plan Assignment – DUE Wednesday, March 4**

With the exception of reading reaction papers, all assignments should be digitally submitted to your reading discussion group leader unless otherwise specified by the instructors. All feedback will be provided digitally within your submitted documents, and emailed back to you. As you did last quarter, submit reaction papers to the discussion board for your reading group.

Grading:

Your grade will be based primarily on the quality of the assignments mentioned above. We will also take into account your punctual postings online, your attendance, and your active contributions to class discussions. As with all your work in C&I this year, you may revise and resubmit any written assignment for a higher grade.

Course Schedule

Session #11: January 6 – The Unit Plan (Part I): *The Complete Unit*

A major component of teaching is the analysis, design, and modification of curriculum. In this session we will examine three geometry units on closely related topics. We will consider how these units differ in design, structure and sequence. In class, we will sketch a unit calendar, draft pre- and post-assessments, and consider possible adaptations based on learners of varied proficiencies. This exercise will be an abbreviated version of what you will be expected to do as you design a unit of instruction for your students.

Readings:

- “Shadows;” *Interactive Mathematics Program, Year 1*, Key Curriculum Press.
- “Chapter 3: Similarity and Justification;” *College Preparatory Mathematics, Geometry Connections*
- “Chapter 5: Quadratic Functions;” *McDougal-Littell Algebra 2*

Session #12: January 13 – Mathematics in Context

According to Boaler, “there seems to exist for each individual a complex of relations between the world in which mathematics is developed and the world to which it is applied. Yet widely held opinion still lends itself to the belief that mathematics can be learned in school...then lifted out of school to be applied to any situation in the real world” (pp. 12). In this session we will examine the impact of contextualized mathematics, commonly referred to as “real-world” math, on student learning. The two articles we read this week represent two sides of current and heated debates on whether or not mathematics should be taught in context or not, and what contexts should be used, if any.

Readings:

- Boaler, J. (1993). The Role of Contexts in the Mathematics Classroom: Do they Make Mathematics More Real? *For the Learning of Mathematics*, 13(2).
- Kaminski, J.A., Sloutsky, V.M., & Heckler, A.F. (2008). The Advantage of Abstract Examples in Learning Math. *Science Magazine*. Vol. 320. April 25, 2008 Edition.

Session #13: SATURDAY, January 17 (Note: NO class Tuesday, January 20)

For this session we will meet on Saturday, January 17th at Castilleja School (on Embarcadero Rd., east of the train tracks) **for a TI calculator workshop**. We will formally meet from 9:00am to 12:00pm, but you are welcome to stay for the afternoon portion of the workshop as well, which will focus on the Casio calculator series. Room and materials you should bring TBA.

Readings:

None

DUE this week:

Tuesday, January 20 – Submit drafts of your two lesson plans for the Elaborated Lesson Plan (Part II) Assignment.

Sunday, January 25 – Send drafts of your culminating assessment(s) for the Unit Plan Assignment to your peer review partner.

Monday, January 26 – Submit draft of your Unit Overview for the Unit Plan Assignment.

Session #14: January 27 – The Unit Plan (Part II): *Using the Wheel Wisely*

While many new teachers believe that the best teachers create most of their curricula from scratch (Ball & Cohen, 1996), in reality the most effective teachers know how to use existing materials most wisely and flexibly, including their existing text, other texts, and materials from other teachers, and do so on consistent bases. In this session, which continues our work in session #11, we will spend time discussing and practicing this important part of unit design. A large chunk of this session will also be spent workshopping your assessment drafts in pairs.

Readings:

Peer's culminating assessment drafts

DUE this week:

Monday, February 2 – Final Elaborated Lesson Plan Assignment, Part II DUE

Session #15: February 3 – Classroom Discourse

Evidence shows that classroom discussion is important in students' development of mathematical understandings (e.g. Wood, 1999). But what *is* a classroom discussion? How is it facilitated? When is it the most effective activity structure for developing valued understandings? What norms must be in place for it to take place? In this session we will delve into these questions and others, and consider what the "best" kinds of classroom discourse might look like.

Readings:

- Wood, T. (1999). Creating a context for argument in mathematics classroom. *Journal for Research in Mathematics Education*, 30(2). 171-191.
- Yackel, E. (1995). Children's talk in inquiry mathematics classrooms. In P. Cobb and H. Bauersfeld (Eds.). *The Emergence of Mathematical Meaning: Interaction in Classroom Cultures*. Hillsdale, NJ: Erlbaum. 131-162.

DUE this week:

Monday, February 9 – Submit draft of Unit Plan Calendar (for UPA)

Session #16: February 10 – *Math Circles Workshop*

****NOTE: Class will meet today from 1:00pm – 4:00pm****

In this session guest facilitator Josh Zucker, director of the Julia Robinson Mathematics Festival, will introduce us to *Math Circles*, a way to engage students in rich mathematical problem-solving and discussion. More info can be found using these links:

About the festival: http://www.msri.org/specials/festival/index_html

About what's happening in C&I: <http://www.theteacherscircle.org/>

Readings:

- Moyer, P.S. (2002). Are We Having Fun Yet? How teachers use manipulatives to teach mathematics. *Educational Studies in Mathematics*, 47, 175-197.
- McNeil, N., & Jarvin, L. (2007). When theories don't add up: Disentangling the manipulatives debate. *Theory Into Practice*, 46(4), 309-316.

DUE this week:

Friday, February 13 – Send draft of your Elaborated Lesson Plan(s) (for UPA) *to your peer review partner*

Session #17: February 17 - Instructional Resources: *Manipulatives*

From a sociocultural perspective, learning is often accomplished with the use of tools, models and representations in particular settings and with particular goals. In the past twenty years, there has been much discussion among math educators about the role and usefulness of concrete materials (ex: algebra tiles) and digital technologies as learning tools. In the next three sessions we will explore a variety of these tools, from Cuisenaire rods to Geometer's Sketchpad, and discuss the affordances and constraints of each tool for learning mathematics.

Readings:

- Moyer, P.S. (2002). Are We Having Fun Yet? How teachers use manipulatives to teach mathematics. *Educational Studies in Mathematics*, 47, 175-197.
- McNeil, N., & Jarvin, L. (2007). When theories don't add up: Disentangling the manipulatives debate. *Theory Into Practice*, 46(4), 309-316.

DUE this week:

Monday, February 23 – This is the last day to submit any piece of your UPA for feedback from your RDG leader! You do not *have* to submit anything.

Session #18: February 24 – Instructional Resources: *Lessons from the Summit Preparatory Charter High School Math Department*

****NOTE: Class will meet in Big Tree computer lab on the bottom floor of CERAS****

Session #19: March 3 – Instructional Resources: *Dynamic Software*

****NOTE: Class will meet in Big Tree computer lab on the bottom floor of CERAS****

DUE this week:

Wednesday, March 4 – Final Unit Plan Assignment DUE

Session #20: March 10 – Bringing it All Together

Readings:

- Lampert, M. (1985). How do teachers manage to teach? Perspectives on problems in practice. *Harvard Educational Review*, 55(2), 178-194.