Education 195-C

3 Units

PREPARING TO TEACH MATHEMATICS AND SCIENCE:
A FOCUS ON EQUITY AND URBAN SCHOOLS

Faculty

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And By Appointment

Location: 4609 Tolman Hall
Course Overview

Education 195-C serves as an equity-focused introduction to teaching and learning mathematics and science in urban schools. It is not intended to replace a “methods course” in these subject areas, though issues of practice will be addressed in the context of equity. Students will have ample time in CaT-I and CaT-III courses, and in their professional preparation programs, to examine and develop subject matter-specific curriculum, pedagogies, and assessment methodologies.

The course is organized into three sections, each with a slightly different focus on educational equity, teaching, and learning. The first deals with the historical, economic, political, and legal foundations that frame much of the equity challenges in our public schools. It examines the opportunity and achievement gaps that separate urban youth from their peers in non-urban/suburban schools, especially in the subject areas of mathematics and science. It also examines current conditions and measures of equity. It concludes with a close up view of schools that are making a difference for students of color and students in poverty despite the odds.

The second section examines specific subgroups of students including: low income, socio-economically disadvantaged students, English language learners, special education students, ethnic subgroups – African America, Latino, Native American students, and girls/young women (in mathematics, science, engineering fields). This section also examines the unique challenges of each subgroup in the context of teaching and learning, as well as the overall goal of achieving equity and excellence in our schools.

The final section of the course turns to the classroom and examines issues of curriculum, pedagogy, and assessment of student learning in mathematics and science. Best, or in some cases, promising practices are explored for their relevance and practicality in advancing equity-focused teaching and learning.

Concurrent with the course work (lecture, readings, discussions), students have an option to participate in a field experience in a Bay Area school. A veteran teacher will supervise UCB students and provide support for understanding and appreciating teaching and learning in an urban setting. Students will maintain a journal throughout and begin the development of a portfolio of their teaching including reflections, evaluation, artifacts, etc.
Course Elements

1. Class meetings.

Classes will consist largely of discussions and presentations by faculty, GSIs, and groups of students; there will be only limited lecturing (or “lecturettes”). We will tend to run these classes as extended conversations — between students and us, among students, among all of us and others who have written and thought hard about equity and education in the urban context. We will often break the class into small groups to work collectively on specific issues.

Active participation in discussion is an essential part of learning and hence of evaluating your work. Participation means listening as well as talking, monitoring your own contributions to a discussion, helping others develop their ideas, and, of course, expressing your own thoughts in whole and small-group discussions. In order to participate it is essential to complete the required readings before class. This does not mean you are expected to have a complete understanding each and every reading, but you should come with questions and an overall sense of each selection's content and argument.

If you have to miss class, please contact a fellow student to find out what you missed.

2. B-Space.

We will be using a B-Space site throughout the course. All students should sign up for a Blackboard account and register with this course as soon as possible. Instructions will be provided in the first class. Rick Ayers, one of our two GSIs, will serve as point person for the faculty in terms of managing B-Space, answering questions, etc. If you are not presently familiar with B-Space, please review the web site: https://bspace.berkeley.edu/

3. Readings.

We expect that students will come to each class prepared to discuss the assigned readings. It is important to read actively and critically, identifying the critical elements that inform your understanding of equity as well as the implications for effective classroom practice. It is also important to read relationally; that is, most readings (at least the readings within each topic) have some relationship to every other reading, and it is valuable to be explicit about how one reading comments on others.
4. Papers.

The principal writing requirements of the class are two short papers (around five double-spaced pages each). You will be given specific instructions for each paper. In addition, we would like you to write a short, ungraded autobiography, no more than two pages. Each of the papers is briefly introduced here.

The autobiography is a short statement about who you are – as a person, as a UCB student, and as a prospective teacher. What you choose to include is entirely up to you. Our purpose is to get to get to know you and for you to know each other. We believe knowing your students is an important element of good teaching. You will be asked to share your autobiography with your small group. You may read it or simply share what you’re comfortable sharing. The faculty and GSIs will read all autobiographies.

The first paper asks you to identify and analyze the equity challenges in California’s public school system. You will be asked to pose an initial “statement of the problem,” as well as a set of questions or issues you need to examine further (or think more about) to be more informed about the essential equity challenges in our public schools today. You will be invited to speculate on some possible solutions or interventions that have potential to redress the problems you identified. Feel free to discuss school improvement or reform ideas that you know about, have researched, or, perhaps, have experienced.

The second paper, due at the end of the semester, will ask you to discuss your evolving sense of what you hope to accomplish while teaching either mathematics or science in the urban context. You will need to draw on your field experiences, readings, and discussions to propose a plan for teaching mathematics or science in the urban context with equity foregrounded. Your equity-centered analysis of the issues related to your plan can be focused on topics from one or all of the three sections of the course.

Papers are due as follows:

- The autobiography is due January 23.
- Paper No. 1 is due at the conclusion of Section I, February 26.
- Paper No. 2 is due at the conclusion of Section III, May 8.

Both papers and your autobiography should be word-processed, using 12-point font size. We prefer “Times New Roman” font or something comparable.
In addition to your papers, you will be asked to maintain a personal journal of activities and reflections emanating from class discussions, readings, and field experiences. We will occasionally use the last 10 minutes or so of class time to allow you to write in your journal. We will read and comment on journals, though we consider the content confidential (i.e., from your supervising teachers and fellow students). Journals will be turned in and reviewed at the conclusion Section II, March 22, and Section III, May 8. They will be returned shortly thereafter.

Finally, towards the end of the semester you will begin developing a professional portfolio. The portfolio includes teaching-related artifacts (e.g., lesson plans, student work), papers, and other relevant information that illuminates the nature of your thinking and classroom/teaching experiences. Portfolios are due the last class session, May 8.

5. Grading.

Our view of grading is that letter grades record your accomplishments. We do not use letter grades to rank or sort students. We will do our best to set clear standards and help you reach those standards. Given the focus of this course, it is our hope that the evaluation processes will contribute to your learning and inform your developing sense of the teaching profession.

With that said: late assignments will be accepted only if prior arrangements have been made with both instructors.

Approximate grading weights:

- Autobiography: N/G
- Attendance, Participation: 30%
- Journal: 20%
- Portfolio: 20%
- Papers 1 and 2 (15% each): 30%
SECTION I:
UNDERSTANDING AND ADDRESSING EQUITY ISSUES IN URBAN SCHOOLS

1. HISTORICAL CONTEXT FOR EXAMINING EQUITY IN SCHOOLS (JAN. 16, 18)

January 16. We will focus largely on overviewing the course, discussing why it is offered as part of the CalTeach program at Cal, introducing the field experience component (required for CalTeach students), and answering questions. 

Homework: We want you to examine two landmark legal cases – Brown v. Board of Education (1954) and Eliezer Williams, et al. v State of California (2000). The Internet maintains a substantial file on each. You are encouraged to peruse multiple sources. You are not expected to know the details of either case; read for the big ideas and consider the meaning and significance of each.

Please consider the historical and political context, the cases themselves, the findings of the Supreme Court in the case of Brown, and the 2004 settlement in the case of Williams.


   c. Begin writing your autobiography – further instructions will be given in class.

January 18. We will discuss the US Supreme Court decision of 1954 - Brown v. Board of Education, and nearly 50 years later, the case and eventual settlement of Eliezer Williams, et al. v. State of California. These “bookend cases” provide an historical, political, and legal foundation for understanding the related challenges of teaching, learning, and equity in urban contexts.

Homework: Review the following two articles; both are in your reader.


   c) In addition, explore student achievement disparities across schools and districts in using Data Quest, a California Department of Education website that allows users to query a
comprehensive student achievement database (http://dq.cde.ca.gov/dataquest/). Pick a local Oakland school (e.g., Oakland Technical Senior High)…see what you discover about how well certain subgroups have done on achievement tests, the High School Exit Exam, etc. Compare this to your own high school, or to a majority White, suburban school such as Palo Alto High School. See how the schools compare to district, county, and state averages. Please note that these statewide tests are not the sole indicator of student learning. Like any assessment, they have a certain utility as well as limitations.

d) Autobiography is due Monday, Jan. 23.

### 2. California’s Current Education Equity Context

**January 23.** Autobiographies turned into to small group facilitator. We will discuss the facts and essential issues related to the “opportunity to learn gaps” in California schools. Oakes’ analysis, as well as the EdTrust West report, provides insightful perspectives on the relationship among racial segregation, unequal conditions, and students’ educational chances in California’s schools. In small groups we will discuss what we learned/discovered using Dataquest.

**Homework.** Read “Introduction” to Made in America by Laurie Olsen (1997). This chapter is in your reader. Focus on the questions Olsen poses and attempt to identify those that strike you as significant in terms of informing and shaping your vision for public schooling in our diverse society, and perhaps, your initial sense of what teaching in urban schools might be all about in terms of your (future) role as teacher.

**January 25.** We will spend this class session in small groups reviewing Olsen’s introductory chapter and discussing key questions and their equity-related implications.

**Homework.** We want you to do Internet research to learn about the federal law, “No Child Left Behind” (NCLB). The purpose of your research is to gain a basic understanding of NCLB – what it is, why it exists (e.g., see the text of the law: Sec. 1001, “Statement of Purpose”), and what it holds in terms of potential to redress longstanding opportunity and learning gaps separating subgroups of students. You are by no means expected to understand the details of this law. The following Internet sites may be helpful:

- [http://www2.edweek.org/rc/issues/no-child-left-behind/](http://www2.edweek.org/rc/issues/no-child-left-behind/). The core elements of NCLB.

### 3. Re-Framing the Equity and Student Achievement Challenges in Public Schools

**January 30.** We will discuss the central elements of NCLB, including its intent and specific implications for teachers and students. The focus is on understanding the law, how it is applied in California, and its relationship to equity. We will discuss why many educators and policy
makers believe NCLB reframes the nature of the equity and student achievement challenges in our public schools.

Homework. We want you to extend your understanding of NCLB and learn why the closer one gets to the schoolhouse the more controversial NCLB actually becomes. Many, though not all, teachers find it unrealistic, punitive, and limiting in terms of their professional autonomy. Similarly, many state officials in California and elsewhere feel it overreaches and encroaches on state and local discretion. We included several articles in the reader that provide a critical analysis of NCLB. Read one or two that seem most interesting and relevant and be prepared to share your impressions/perspectives next class. These include:


February 1. We will retain the focus on NCLB, but in this class session we will look more critically at the law, including its perceived and actual shortcomings.

Homework: Interview your “supervising teacher” (and others, perhaps the principal) at the school where you do fieldwork. Inquire concerning his/her views regarding NCLB and California’s accountability/testing system. Focus on the question of whether NCLB (and California’s application thereof) can leverage changes in achievement that support our goal of equity.

Based on your readings, class discussions, and interview/s, write a statement in your journal (approximately 1-2 pages) that summarizes your views about NCLB and its potential to close the learning gaps among subgroups of students. Please be prepared to share (or summarize) your views in small groups.

4. EQUITY IN PRACTICE: SCHOOLS MAKING A DIFFERENCE (Feb. 6, 8)

February 6. We will meet in small groups to discuss and analyze our individual perspectives on NCLB.

Homework. We will organize reading (homework) assignments in class. The readings below provide opportunities to examine how and why certain schools, despite the odds, succeed in raising student achievement and closing the learning gaps among subgroups. We will investigate these readings in “jigsaw” fashion (to be explained). All articles are in your reader. They are:


**February 8.** Small group discussions about how and why certain schools and districts are able to increase student achievement against the odds. We will explore a number of questions, including: What lies at the heart to these efforts and to what extent are these successes replicable? What are the implications for teachers who aim to close the learning gaps between student subgroups?

SECTION II:
CALIFORNIA’S STUDENTS:
WHO THEY ARE AND WHY IT MATTERS

5. EDUCATIONAL EQUITY & SOCIAL CLASS  (FEB. 13, FEB. 15)

February 26. We will begin with an overview of this section of the course with an emphasis on our rationale for including a focus on students’ identities and why we feel this is so important. In addition, we will discuss why we cover the subsections in a particular order. Following this, we will discuss Rothstein’s chapters about social class and student achievement. As a whole class we will examine his basic ideas and what they imply in terms of teaching and education equity.

Homework. Write a statement in your journal (approximately 1-2 pages) that summarizes your views about social class and educational equity. To what extent do you believe social class mitigates against school and teacher efforts to close the learning gaps? Is social class just too powerful a factor in terms of defining the achievement gaps among subgroups of students? Per Rothstein, do teachers and students have any reasonable chance to overcome what social class implies in terms of improving their education chances? Please be prepared to share (or summarize) your views in small groups.

February 28. We will meet in small groups to discuss and analyze our individual perspectives on social class and its implications for the education of urban youth.

Homework. Our next topic, the education of California’s English Learners (EL) is substantial, complex, and deserving of careful thought and attention. A useful starting point is a California Department of Education publication entitled, “English Language Learners: Frequently Asked Questions.” This is on-line at; first link below. Familiarize yourself with some of the basics.

The following Internet sites also may be helpful if you want to explore further.

http://www.cde.ca.gov/sp/el/er/ (see “FAQs about English Learners”)
http://lmri.ucsb.edu/index.php
http://www.lmp.ucla.edu/

6. EDUCATIONAL EQUITY & ENGLISH LANGUAGE LEARNERS  (FEB. 20, 22)

March 6. We will discuss the changing demographics of California schools and what these changes mean in terms of teaching, learning, and equity. We will then discuss how California schools and teachers are responding to these changes and to the laws governing the education of English learners.

Homework. Read either article below; both are in your reader.

a. Gándara, P. & Rumberger, R. (2002). The Inequitable Treatment of English Learners in California’s Public Schools. PACE. Or...
March 8. We will discuss both articles in small groups.

Homework. Read, Ferri, B., Connor, D., Tools of Exclusion: Race, Disability, and (Re)segregated Education (2005). This is in your reader.

7. EDUCATIONAL EQUITY AND ETHNICITY (FEB. 27, MAR. 1)

February 27. We will discuss how the school experience can differ for students of different cultures. We will examine the demographics and recall the experiences of the students from your field assignment. We will brainstorm how our own cultures, the culture of school, our students’ cultures and the culture of science mix. Lee’s and Delpit’s works will support the discussion.

Homework. Read either article below; both are in your reader.

Or…

March 1. We will continue to discuss the nature of school culture and the cultures of students in urban schools. We will share how the authors suggest that teachers can best bridge the cultural divides they may confront. We will conclude with major assets for and challenges to informing science and math teaching with cultural insights.

Homework. Read either article below.

Teachers College Record Volume 97 Number 2, 1995, p. 206-226. This is in your reader.
Or…
Kim Tolley, Conclusion from The Science Education of American Girls, 2003. We will provide this reading.

8. GENDER EQUITY IN MATHEMATICS AND SCIENCE (MAR. 6, 8)

March 6. We will discuss how gender influences the classroom experience for students. We will integrate today’s reading, field notes from your journals and insights from past weeks.

Homework. Read either article below; both are in your reader.

Read "Out Front" by Annie Johnston from Rethinking School Reform ed. Linda Christensen and Stan Karp.
OR
Teaching the Whole Story, One school's struggle toward gay and lesbian inclusion, from Rethinking our Classrooms

March 8. We will discuss today’s readings and synthesize our perspectives on gender equity and sexual orientation sensitivity.

**Homework.** Read Ferri, B., Connor, D., Tools of Exclusion: Race, Disability, and (Re)segregated Education (2005). This is in your reader.

| 9-10. TYING IT ALL TOGETHER | (MAR. 13, 15, 20, 22) |

March 13. We will discuss the intersection of ethnicity, disability and segregation in schools.


March 15. We will discuss the perspectives of hooks on teaching for equity considering the complex reality of students’ cultures. In groups, we will brainstorm key hidden messages and meanings that are possible blocks to equity but which can be reframed as assets.

**Homework.** Identify 1 to 2 central concerns for manifesting equity. Build on your first paper’s insights if possible. You may choose to explore these concerns as you read Section III’s literature and write your final paper. Draft your final paper’s central plan.

March 20. We will analyze and critique each other’s final paper plans. We will discuss final paper expectations. Review your journal in order to select a key journal entry that illustrates a main aspect of your teaching philosophy or a part of your portfolio.

**Homework.** Prepare a 1-paragraph introduction to your journal and outline its contents. Create a 1-page equity framework that you can add to your portfolio and/or journal. This may be a checklist that reminds you of key resources, helps you discuss equity with colleagues or inspires you if you become discouraged. Choose the format that is most helpful for you. Review your notes from Feb. 8.

March 22. We will share our equity frameworks, fill out midterm evaluations and check in. Please turn in your journals.

**Homework.** Read chapter 8 of Barton, Angela Calabrese. (2003) *Teaching Science for Social Justice.* This is in your reader.
SECTION III:
MANIFESTING EQUITY IN SCIENCE AND MATH CLASSES

11. ORGANIZING CLASSROOMS FOR EQUITY – FOCUS ON OPPORTUNITY
   (APR. 3, 5)

April 3. We will discuss Barton’s theories of youth’s science practice in informal educational settings. We will suggest how Barton’s theories could inform a formal classroom experience and expand students’ access to learning opportunities.

Homework. Read the following in your reader:

April 5. We will discuss Oakes’s argument regarding the impact of on educational inequities, noting her analysis of the balance of benefits and drawbacks to tracking. Seek patterns of successful classroom organization in your journal, in your equity goals (your theory of learners, of your role as a teacher and of the foundation on which an equitable education is built) and in any relevant readings from the class.

Homework. Examine your own field placement in terms of the readings. Describe the physical and institutional context of your class and list the artifacts and/or journal entries on which you based your analysis of the organization of the class with respect to equity. Read the following in your reader: Darling-Hammond, Linda. (1994). Performance-based assessment and educational equity. Harvard Educational Review 64, 5-26.

12. EQUITY AND ASSESSMENT OF STUDENT LEARNING
   (APR. 10, 12)

April 10. We will discuss the homework and then turn to Darling-Hammond’s article concerning the purpose of assessment and a commonly overlooked criteria for assessment validity. We will revisit NCLB from the first paper. We will also examine various assessments, introduce useful assessment terminology and note how assessment relates to larger education goals.


April 12. We will discuss Steele’s notion of stereotype threat. We will discuss ways to incorporate this awareness into our classes. In class, we will gather key characteristics of equitable assessments.

Homework. Seek patterns of successful classroom assessments by using journal or portfolio examples, your equity goals (theory of assessment, its limits and of the variety of knowledge in
your science or math domains) and the readings from the class. Also isolate any primary equity challenges associated with assessment. Perhaps discuss the topic openly with your mentor teacher. Collect (or have collected) 2 assessments from the field that illustrate 1) a central theme of your analysis of assessments in the class and 2) your own equity-focused goals for assessment.


**13. PEDAGOGY**

**APR. 17, 19**

April 17. We will discuss homework and then explore the following questions: How does Ladson-Billings’s notion of culturally relevant pedagogy relate to the definitions of equity developed in the class? How does Ladson-Billings’s notion of good pedagogy relate to your own preferred pedagogy? How are different learning styles incorporated?

We will also look at model teaching portfolios and philosophies from mentors.


April 19. Connect Ladson-Billings’s framework to Gutstein et al.’s findings.

**Homework.** Read the following in your reader:

**14-15. BEST PRACTICES**

**APR. 24, 26, MAY 1**

April 24. We will discuss how Moses’ theory of learning informs the pedagogy of the Algebra Project. We will also try out other materials and practices used in local urban middle schools. The discussion will be built around culturally relevant pedagogy, your definitions of equity and other relevant readings from the class.

**Homework.** Online, explore the following: Lawrence Hall of Science. Full Option Science System; Great Explorations in Math and Science; Science Education for Public Understanding Program. www.lhs.berkeley.edu/publications/

April 26. We will contrast both the theories of learning behind the Lawrence Hall of Science and Algebra Project curricula and the communities reached by the Lawrence Hall and Algebra Project curricula. Use Angela Barton’s theories to contrast the resources employed, who contributed to the curricula and how accessible the programs are.
groups, we will analyze a GEMS or a FOSS program using your equity definitions and the idea of culturally relevant pedagogy.

**Homework.** Read either article below; both are in your reader.

Carroll P. and Gallard, A., Students and Their Teacher Talking in the Middle School Science Classroom: What Does Their Discourse Mean?  
OR  
Barton A.C., Feminist Science Education, Chapter 1, 1998.

**May 1.** We will discuss how the authors’ perspectives on discourse and feminist science education relate to our expanding goals for equitable science and math teaching.

**Homework.** Read the following in your reader: hooks, bell. “Teaching to Transgress: Education as the Practice of Freedom.” Introduction, Chapter I. NY: Routledge.

**15-16. BUILDING YOUR PORTFOLIO (MAY 3, 8)**

**May 3.** We will discuss major themes from hooks’s introduction. Some portfolios will be shared.

**Homework.** Finish your final paper and assemble your portfolio.

**May 8.** Enjoy sharing key ideas from your paper and portfolio. Fill out final evaluations.