

**University of California – Riverside**  
**Graduate School of Education**

Winter, 2019

Imagining Teaching: Science-Mathematics Emphasis: Education 03

Section 1

3 Units

Instructor: Michael Towne

Tuesday, 4:10-6:00

Sproul 1357

Sproul 2201

Tuesday, 6:00-7:00

mtown001@ucr.edu

michael.r.towne@gmail.com

## **Education 3: Imagining Teaching: Science-Mathematics Emphasis**

### **COURSE OVERVIEW**

#### **CATALOG COURSE DESCRIPTION**

This course considers images of teaching produced in popular culture, professional writing, and personal recollections, and how the images impact and reflect teaching in schools. This course addresses topics related to teaching mathematics and science in the K-12 classroom.

**Course Pre-requisites:** *No Prerequisites*

#### **COURSE OBJECTIVES**

- To observe, and participate in public school classrooms to gain insight into the profession
- To focus on the interactions between teachers and students
- To develop understanding of the effect of outside influences on student achievement
- To view education/teaching from a teacher's perspective and its role in society

#### **LEARNING OUTCOMES**

- Students develop written analysis of academic papers.
- Students familiarized with standards-based instruction and the California Common Core Mathematics Standards and the Next Generation Science Standards.
- Students observe and assess classroom practice using analytic techniques.
- Students introduced to lesson design and planning.

### **UCR-GSOE POLICIES**

#### **STUDENTS WITH DISABILITIES POLICY**

If you have a disability or believe you may have a disability, you can arrange for accommodations by contacting Services for Students with Disabilities (SSD) at 951-827-4538 (voice) or [specserv@ucr.edu](mailto:specserv@ucr.edu) (email). Students needing academic accommodations are required to register with SSD and provide required disability-related documentation. If you have approved accommodation(s), you are advised to notify your instructor privately.

#### **ATTENDANCE POLICY**

GSOE takes seriously the need for students to attend and actively participate in classes; class absences and lack of participation undermine the learning process. Students who miss more than 20% of the course meeting are strongly urged to withdraw from the course. Instructors may also fail such students, except in the case of documented serious illness or immediate family emergency. Missing portions of classes, through persistent late arrival or early departure, can count toward the "more than 20% of class time."

## **ACADEMIC HONESTY POLICY**

Students are expected to conduct themselves and their work in a manner consistent with UCR's policy on academic integrity. Academic misconduct includes, but is not limited to, cheating, fabrication and plagiarism (e.g., using another's work or ideas without giving credit- intentionally or unintentionally). Submitting your own work more than once (e.g. for this class and another class, without both instructors' knowledge and permission) is also a form of academic dishonesty and will result in an F. If you are at all unsure of what constitutes plagiarism or other forms of academic dishonesty, consult the UCR website for more information: <http://conduct.ucr.edu>. Please familiarize yourself with UCR's policies and procedures regarding academic integrity, published in full in the General Catalog at <http://catalog.ucr.edu>.

## **WRITING POLICY**

The Graduate School of Education believes that all students should exit its program with strong writing skills. As such, the quality of written composition as well as content will be factored into grades on students' papers for all education classes.

## **COURSE POLICIES**

### **ELECTRONIC COMMUNICATION POLICY**

As a default, I will be sending class emails to your UCR email, as it is also the email UCR staff will use when sending you important emails. Plus, it will help get you into the habit of using a more professional email for school and for potential future work. When sending me an email, please include your last name, followed by the course number, and followed by the purpose of the email in the subject heading (Example: Safie – ENV102 – Question about Final Exam). Keep in mind that I will respond within 24 hours during the week and within 48 hours on the weekend unless the email is sent during my office hours, at which time you will get an almost immediate response.

### **BEHAVIOR/CONDUCT**

- Please arrive to class on time.
- UCR is a smoke-free campus. Smoking is not allowed on campus.
- No cell phones in class. Please step outside to make or receive a call.
- Please be considerate and attentive during presentations and discussions. Do not text, draw or use your computer during presentations and discussions. Exceptions include the use of electronic devices for note-taking.
- Please be respectful of others while setting up desk space. Do not create an obstacle course with all your belongings. Cooperating with one another is the best way to make the most of limited space.
- Please properly dispose of all trash. We are *all* responsible for the maintenance of our campus and classrooms.
- Please use appropriate language when sharing thoughts and opinions. We all have our own views, but the goal is to create an environment that encourages dialogue and personal growth.

### **LATE PAPERS/ASSIGNMENTS**

Late assignments will be accepted up to 3 days beyond due date, but will be decreased in total points by 10% unless accompanied by documentation that excuses the late assignment. If accompanied by a legitimate excuse, the assignment will not be decreased by 10% during the time period the excuse covers. Examples of acceptable excuses are:

- Illness with a doctor's note
- Having to care for an ill loved one
- Having a death in the family
- Being involved in a car accident

Communication is key to your success. If something happens, please let me know and we can work through your options for success in the course.

### **UCR ACADEMIC RESOURCE CENTER (for undergraduate students)**

The Academic Resource Center (ARC) is the central resource for academic support at UCR. All students are strongly encouraged to visit the ARC, which is staffed by professional and student employees who are well trained to provide academic support and dedicated to fostering academic excellence. Resources provided by the ARC include Tutoring, Supplemental Instruction, Study Skills Workshops, as well as several peer mentoring programs. Participating in these services is most useful to students when used pro-actively for academic enrichment. Visit [arc.ucr.edu](http://arc.ucr.edu) or call 951-827- 3721 for more information about hours, location and the schedule of services.

**COURSE RESOURCES: This is a weekly list of the reading material you will be responsible for. All readings are available through the UCR Library or the CDE website.**

**Readings:** While reading the assigned course materials for each week, please consider the following:

- a) On which points do you agree with the author(s), and why? Alternatively, on which points do you disagree, and why?
- b) How might you incorporate the ideas raised in the reading into your thinking about teaching AND into your actual practice as a teacher?
- c) During your observations in your assigned classroom and as you observe the class videos, what do you see that corroborates the views of the authors of papers we have read? What do you see that contradicts what you have read?

### **ASSIGNMENTS**

- a) **Course Journals (5):** Due via e-mail by the beginning of class on due dates.

How to submit Journal Assignments:

Email to [mtown001@ucr.edu](mailto:mtown001@ucr.edu) with your essay attached as a Word Document attachment.

**Please place in Subject Line the following –**

**Educ3\_LastName\_FirstName\_Journal1**

Substituting your last and first names and the appropriate journal number.

What to include in your Journal Assignment:

As you complete your hours in a classroom and view the assigned videos, you will become aware of different issues. Your task is to write a brief essay (400-600 words) connecting your observations to one or more of the journal articles read in class the previous week and/or the class discussions. This is an informal paper, but still should conform to APA guidelines for citation and format. Be brief and focused. The main point is to apply what you have learned in class through readings or discussions to your observation. It is important to develop your classroom observation skills through informed reading and reflection.

**Written Papers (2):** Due via e-mail by the beginning of class in week 6 (**Paper 1 Observation**) and week 9 (**Paper2 Reflection**).

b)

How to submit Written Papers:

Email to [mtown001@ucr.edu](mailto:mtown001@ucr.edu) with your essay attached as a Word Document attachment.

**Please place in Subject Line the following –**

**Educ3\_LastName\_FirstName\_Paper1**

Substituting your last and first names and the appropriate paper number.

What to include in your paper:

Each written paper should be between 3-5 pages in length and conform to APA guidelines. The purpose of these papers is to put the course readings in dialogue with your observations in the classroom and our discussions in class. The expectation for this paper is to engage in academic discussion, critique and observation of classroom practice informed by academic research. Details provided in class two weeks before due date. These are formal papers that need to conform to APA guidelines.

- c) **5E Lesson Plan Group Project:** Each student will be assigned to a group of three students to develop a single lesson plan using the 5E Lesson Planning Guide. Each member will be required to turn in one written section of the plan (an Explore/Explain section or an Elaboration Section). The group is responsible for turning in one complete lesson plan, which includes each of the three individual sections written by each member of the group (Explore/Explain or Elaborate) plus the Engage and Evaluate sections, written collaboratively by the group. Finally, the group is responsible for presenting to the class how they would teach the proposed lessons. Details given in class.
- d) **Field Experience and Video Observation with Analysis:** Students are expected to complete 1-2 hours of field experience per week (minimum total 15 hrs for the quarter) and a total of 1-2 hours of on-line video observations (minimum total 15 hrs for the quarter) with analysis (combined total minimum hours; 30 hours) over the course of 10 weeks. Hours are to be completed on a weekly basis with no more than 2-3 hours in any given week. Since there may be times when you may need to make-up time from a previous week due to school closure, you need to plan and realize the weekly 1-2 hours is expected and NO more than 2-3 hours per week is allowed. These field experience and video analysis hours will be reported on a bi-quarter basis (*a copy of your field log is due on week 6 and the original-final field log is due on week 10*). The weekly 3 hours combined in the field and on-line video observations with analysis is a major component of the “exploration” into teaching, failure to complete fieldwork hours, submit verification **OR** failure to participate in classes as outlined in the syllabus could not earn a grade above a C-.

## Readings and/or relevant lesson materials

### Week 1

A New Generation of Standards in California

California Adopted Standards

[California NGSS \(Adopted 2014\)](#)

[California CC Math \(Adopted 2013\)](#)

California Adopted Frameworks

[California Mathematics Framework](#)

[California Science Framework \(Adopted 2016\)](#)

[Executive Summary: Math Framework](#)

Video: The rationale behind NGSS

<https://youtu.be/SEc1ENq3FSs>

Video: The rationale behind CCSS Mathematics

<https://youtu.be/gM6gCzuSRhw>

### Week 2

Battey, D. (2013). "Good" mathematics teaching for students of color and those in poverty: the importance of relational interactions within instruction. *Educational Studies in Mathematics*, 82(1), 125-144.

Van Zee, E. H., Iwasyk, M., Kurose, A., Simpson, D., & Wild, J. (2001). Student and teacher questioning during conversations about science. *Journal of Research in Science Teaching*, 38(2), 159-190.

### Week 3

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content Knowledge for Teaching What Makes It Special? *Journal of Teacher Education*, 59(5), 389-407.

Bertram, A., & Loughran, J. (2012). Science Teachers' Views on CoRes and PaP-eRs as a Framework for Articulating and Developing Pedagogical Content Knowledge. *Research in Science Education*, 42(6), 1027-1047.

### Week 4

Gallenstein, N. L. (2005). "Engaging young children in science and mathematics". *Journal of Elementary Science Education*. 17(2): 27-41. (on iLearn)

Henningsen, M. & Stein, M.K. (1997). Mathematical Tasks and Student Cognition: Classroom-Based Factors That Support and Inhibit High-Level Mathematical Thinking and Reasoning. *Journal for Research in Mathematics Education*, 28(5): 524-549. (on iLearn)

Hayden, K., Ouyang, Y., Scinski, L., Olszewski, B., & Bielefeldt, T. (2011). Increasing student

interest and attitudes in STEM: Professional development and activities to engage and inspire learners. *Contemporary Issues in Technology and Teacher Education*, 11(1), 47-69.

### **Week 5**

Lee, O., Quinn, H., & Valdés, G. (2013). Science and language for English language learners in relation to Next Generation Science Standards and with implications for Common Core State Standards for English language arts and mathematics. *Educational Researcher*, 0013189X13480524.

Osborne, J. (2014). Teaching Scientific Practices: Meeting the Challenge of Change. *Journal of Science Teacher Education*, 25(2), 177-196.

Videos

Common Core State Standards an introduction

<http://www.youtube.com/watch?v=9IGD9oLofks&lr=1>

The Importance of Mathematical Practices

[http://www.youtube.com/watch?v=m1rxkW8ucAI&feature=player\\_embedded](http://www.youtube.com/watch?v=m1rxkW8ucAI&feature=player_embedded)

### **Week 6**

Wachira, P., Keengwe, J., & Onchwari, G. (2008). Mathematics preservice teachers' beliefs and conceptions of appropriate technology use. *AACE Journal*, 16(3), 293-306.

Goos, M., Galbraith, P., Renshaw, P., & Geiger, V. (2003). Perspectives on technology mediated learning in secondary school mathematics classrooms. *The Journal of Mathematical Behavior*, 22(1), 2-30.

### **Week 7**

Senk, S. L., Beckmann, C. E., & Thompson, D. R. (1997). Assessment and grading in high school mathematics classrooms. *Journal for Research in Mathematics Education*, 187-215.

Morgan, C., & Watson, A. (2002). The interpretative nature of teachers' assessment of students' mathematics: Issues for equity. *Journal for Research in Mathematics Education*, 78-110.

### **Week 8**

Davis, E.A., Petish, D., Smithey, J. (2006). Challenges new science teachers face. *Review of Educational Research*, 76(4), 607-651.

Borko, H., Peressini, D., Romagnano, L., Knuth, E., Willis-Yorker, C., Wooley, C., Hovermill, J., &

Masarik, K. (2000). Teacher education does matter: A situative view of learning to teach secondary mathematics. *Educational Psychologist*, 35(3), 193-206.

Featherstone, H. (1993). Learning from the first years of classroom teaching: The journey in, the journey out. *Teachers College Record*, 95(1), 93-112.

### **GRADING SCALE**

**Grading:** A = 94 - 100%, A- = 90 - 93%, B+ = 87 - 89%, B = 84 - 86%, B- = 80 - 83%,  
C+ = 77 - 79% C = 74 - 76% C- = 70 - 73% D = 60 - 69% F = below 60%

### **COURSE GRADING REQUIREMENTS**

#### **Assessment Weights:**

Course Journals (5)	15%
Written Paper 1	15%
Written Paper 2	20%
Lesson Plan Project	20%
<u>Field and Video Experience</u>	<u>30%</u>
Total	100%

**COURSE SCHEDULE/ TIMELINE**

**Tentative Schedule for the Course** (subject to change)

<b>Date</b>	<b>Topics</b>	<b>Readings To Be Discussed</b>	<b>Assignments Due</b>
<b>Week 1</b> <b>1/08/19</b>	<b>Intro to EDUC 3 Course</b> (The View on Teaching) <b>Introduction to CCSS and NGSS</b> <b>View Video Cases 251 and 806</b>		a) Read the syllabus posted on iLearn, b) Bring it to the class
<b>Week 2</b> <b>1/15/19</b>	What is good math and science teaching? Introduction to 5E Lesson Planning. Class Demonstration <b>View Video Cases 808 and 1047</b>	Battey (2013)  Van Zee, et al (2001)	
<b>Week 3</b> <b>1/22/19</b>	What knowledge is necessary for math and science teachers? <b>View Video Cases 614 and 261</b>	Ball et al. (2008)  Bertram & Loughram (2012)	Journal #1
<b>Week 4</b> <b>1/29/19</b>	How can teachers teach in ways that are engaging? Detailed Instructions for Paper 1 <b>View Video Cases 703 and 1049</b>	Gallenstein (2005)  Hayden (2011)	Journal #2
<b>Week 5</b> <b>2/05/19</b>	How have we tried to reform math and science education?  Intro to Lesson Plan Format (MH) <b>View Video Cases 292 and 297</b>	Lee, Quinn & Valdés (2013)  Osborne (2014)	Journal #3
<b>Week 6</b> <b>2/12/19</b>	Technology in the math and science classroom  <b>View Video Cases 173 and 988</b>	Wachira et al. (2008)  Goos et al. (2003)	1. Written Paper 1 2. Submit a COPY of your Fieldwork hours (you should have 15-20 hrs at this time)
<b>Week 7</b> <b>2/19/19</b>	How do teachers assess (evaluate) learning? Detailed instructions for paper 2.  <b>View Video Cases 309 and 1015</b>	Senk et al. (1997)  Morgan & Watson (2002)	Journal #4

<b>Week 8</b> <b>2/26/19</b>	Learning to Teach: Pre-service & Beginning Teacher Education	Davis et al. (2006)  Borko et al. (2000)	Journal #5
	<b>View Video Cases 26 and 68</b>		
<b>Week 9</b> <b>3/04/19</b>	Learning to Teach: Modeling a Math/Science Lesson Group Presentation	Benefits of lesson planning – posted on iLearn	Written Paper 2
	<b>View Video Cases 1033 and 1070</b>		
<b>Week 10</b> <b>3/11/19</b>	Learning to Teach: Modeling a Math/Science Lesson Group Presentation	Benefits of lesson planning – posted on iLearn	Comp. Fieldwork Hours Written Lesson Plan
	<b>View Video TBA</b>		

---