EDCI 675: Learning to Teach and Learn Science

Fall 2010- Monday 5:30-8:30 LCC 313

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Office Hours: by appointment

Course Overview

This course is designed as the second in a sequence for prospective science educators in the Masters Certification Program. It comes in the fall semester of the year-long placement in schools, while some of you are observing and assisting in middle and secondary school classes and some are beginning to teach. During this course, we will focus attention on students' science learning and make the transition to thinking about the relationships and interactions between student learning and instructional strategies.

Learning Outcomes

By the end of the course, candidates will show:

• basic understanding of research on science teaching and how it may affect student learning, specifically with respect to conceptual knowledge, reasoning abilities and inquiry, epistemologies, and learning contexts; (InTASC$^1$ 1, 2; EC$^2$ 1, 2, 7; NSTA$^3$ 1, 2, 3, 4, 7)

• familiarity with instructional strategies of attending, assessing, and responding to student thinking; (InTASC 6, 8; EC 7; NSTA 5, 8)

• abilities to plan instruction, based on the materials, curriculum, and students in the classes they are teaching or observing; (InTASC 1, 2, 3, 4, 5, 7; EC 5, 7; NSTA 5, 6)

• abilities to identify, interpret, and design appropriate responses to student thinking as evident in specific case studies of interviews, classroom observations, and first experiences teaching; (InTASC 6, 8; EC 4, 5; NSTA 5, 8)

Goals

• To engage in thoughtful, critical discussion of research on learning and teaching in science

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1 Interstate New Teachers Assessment and Support Consortium (InTASC) Standards
2 Emerging Commitments of the Conceptual Framework of the College of Education
3 National Science Teachers Association Standards
• To analyze student thinking in ways we began in EDCI 411, as evidenced in interviews, samples of written work, and classroom video.
• To develop and critically reflect upon potential affordances and limitations of instructional and assessment strategies, tools, and curricula in the classes you are teaching or observing, with particular focus on supporting student thinking.
• To consider issues of equity in science learning, and approaches to working with students with varied needs.
• To plan, implement, and reflect on classroom instruction.

In EDCI 411, you began to consider research on science learning. We will briefly review ideas from that course, and then continue from there to focus on the craft of teaching.

Assignments and Requirements

During this course, you are expected to:

• attend and participate in seminar discussions
• read approximately 30-50 pages per week
• lead class discussion on one set of readings
• conduct one student focus group discussion, with 4-6 pages of written analysis;
• conduct one observation of classroom learning and instruction, with 4-6 pages of written analysis;
• plan, implement, and reflect on two (2) science lessons, with 4-6 pages of analysis
• complete a unit plan for a unit that you will teach next semester. 4-6 pages
• read, observe, and comment on other students’ work.

It should be noted that this syllabus is a fluid document that will be revised and modified as we move through the course based on student needs, interests, and more generally what is happening in class. You will be kept informed of all revisions of the syllabus.

Specific Assignments (More detail will follow throughout the semester)

** Adhere to the following convention for naming your assignments:
   Last name.AssignmentName.EDCI675.doc
**Leading discussion** (InTASC 9, 10; EC 2, NSTA 10):
Each of you will be asked to lead the discussion of readings, either by yourself or in pairs. Note that there are blank spaces after each reading in the calendar below. Everyone is expected to read all of the assigned readings, but those assigned a particular reading should decide how the reading is discussed (or otherwise treated, acted out, interpreted through dance, etc.) and lead those activities, in order to help the group make meaning of the readings in terms of their implications for teaching. This is part of your participation grade.

**Focus Group** (InTASC 1, 4, 5; EC 1, 4, 6, 7, NSTA 3, 4):
This assignment is similar to the interview assignment from EDCI 411. You will pose a science question (e.g. “Where does all the weight come from, when an acorn grows into a tree?” or “If I leave a wet towel on a rack, and it dries, what happens to the water?” or you might consider posing the same question you did in the student interview from EDCI 411) to middle or high school students and interview no more than a group of 4 students about their thinking. The purposes of the assignment are (1) to develop abilities for eliciting and listening to student reasoning, and (2) to gain insight into that reasoning, into what and how students know and think about natural phenomena.

**Classroom observation and analysis** (InTASC 1, 4; EC 4, 7, NSTA 1, 2, 3, 10):
This assignment asks you to observe a lesson at your school placement, with special attention to students’ ideas and how the teacher responds (or doesn’t respond) to those ideas and/or creates opportunities for student thinking. Your observation will include an analysis of lesson plans and student work (or video) collected during the observation.

**Lesson planning and reflection:** (InTASC 1-8; EC 1, 2, 4, 5, 6, 7, NSTA 1, 5, 8):
This assignment asks you to plan lessons that you will be teaching as part of your fall experience in schools. You will submit, discuss, and revise your plans, and then teach the lessons, finally preparing 4-6 pages of reflection on what took place, based on evidence from students’ written or recorded work. This assignment anticipates the case study assignments that you will complete in the spring semester.

**Unit plan:** (InTASC 1-8; EC 1, 2, 4, 5, 6, 7, NSTA 1-8):
Building on your experience analyzing curriculum in EDCI 411, and your experience planning and teaching lessons, you will prepare a unit plan designed to cover a coherent unit of instruction (ideally one you will be teaching in the Spring) containing a variety of opportunities for students to use scientific knowledge, reason scientifically, and participate in scientific practices and discourse.

**Expectations and Grading**

*Student Expectations:*
You are expected to attend all classes, complete assigned readings before the class period in which they are to be discussed, participate actively and thoughtfully in class discussions, complete required writing assignments, and follow university regulations regarding academic and behavioral integrity.
Your attendance is crucial to your success in this class due to its discussion-based format. Absences will result in a reduced participation and professionalism grade. You may have one absence without any questions asked. Beyond that, your grade will be reduced. If you know you will be absent for a religious observance, let me know well in advance. If extenuating circumstances arise, let me know as soon as possible.

Late work will result in a reduced grade. For each day an assignment is late, half a letter grade will be deducted from the assignment. Extensions will occasionally be granted for extenuating circumstances with documentation and appropriate discussion with me.

If at any time you feel that it would be more beneficial to your education to do something differently in the course, please speak to me. If you experience difficulty in this course for any reason, please don’t hesitate to consult with me.

Grades:

Each assignment is allocated a certain percentage of your grade, as indicated below. You can access your grade via Blackboard.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Class participation</td>
<td>15%</td>
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<tr>
<td>Focus group</td>
<td>15%</td>
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<tr>
<td>Observation and Analysis</td>
<td>15%</td>
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<tr>
<td>2 Lesson plans with analysis</td>
<td>40% (@20%)</td>
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<tr>
<td>Unit plan</td>
<td>15%</td>
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Grading Scale

- A+ (100)
- A  (93 to 99)
- A-  (90 to 92)
- B+ (87 to 89)
- B  (83 to 86)
- B-  (80 to 82)
- C+ (77 to 79)
- C  (73 to 76)
- C-  (70 to 72)

Readings:

There is no textbook for this course. Readings will draw from the science and general education literature. Articles will be posted to Blackboard in advance or handed out in class. This is a tentative list that may be modified.


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Tentative Calendar: Fall 2011
Each course meeting will include the discussion of the assigned reading, which everyone is expected to read in advance carefully and critically. We will also: do science; analyze curricula, assessment materials, and examples of student work from school placements; watch and discuss classroom video; share and critique examples of our work.

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<thead>
<tr>
<th>Date</th>
<th>Topic and Assignments</th>
<th>Readings</th>
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<tbody>
<tr>
<td>Sept. 12</td>
<td>Models of students’ science learning</td>
<td>Strike &amp; Posner, 1992 <strong>Dan</strong></td>
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<td></td>
<td>Attending to student thinking</td>
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<td></td>
<td><strong>Focus group interview assigned</strong></td>
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<td>Sept. 19</td>
<td>Science education standards and practices</td>
<td>National Science Education Standards (selections)</td>
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<td>Sept. 26</td>
<td>Inquiry</td>
<td>Hammer (1997)</td>
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<td><strong>Focus group interview due</strong></td>
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<td><strong>Observation and analysis assigned</strong></td>
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<td>Oct. 3</td>
<td>Nature of Science</td>
<td>Carey &amp; Smith (1993)</td>
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<td>Oct. 10</td>
<td>Argumentation</td>
<td>Kuhn (1989); Engle &amp; Conant (2002)</td>
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<td><strong>Observation and analysis due</strong></td>
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<td><strong>First lesson plan assigned</strong></td>
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<td><strong>First lesson plan due</strong></td>
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<td><strong>First lesson plan analysis due</strong></td>
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<td><strong>Second lesson plan assigned</strong></td>
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<td>Nov. 14</td>
<td>Technology and media</td>
<td>Sandoval &amp; Daniszewski</td>
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<td><strong>Second lesson plan due</strong></td>
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<td>Nov. 1</td>
<td>Under-represented students</td>
<td>Seiler (2001); Kurth et al., (2002)</td>
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Students with special needs
Second lesson plan analysis due
Scruggs & Mastropieri (2007)

English Language Learners
Academic language
TPAC
Roseberry & Warren (2001)

Teacher Inquiry
Unit Plan due
Hammer & Schifter (2001) Dan

Course Evaluations

As a member of the UMD academic community, you as a student an important responsibility to submit your course evaluations each term though CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. The link through which you can access the evaluation system is: www.courseevalum.umd.edu. Once you submit your electronic evaluations, you can access all posted results via Testudo under CourseEvalUM Reporting. More information on the electronic evaluation system is available at:

https://www.irpa.umd.edu/Assessment/CourseEval/stdt_faq.shtml

Student Rights and Responsibilities

Students will not be penalized because of observances of their religious beliefs. Whenever possible, students will be given reasonable time to make up any academic assignment that is missed due to participation in a religious observance. Please advise me as soon as possible of any absences for religious observances.

Students at the University of Maryland are held to the highest level of academic integrity. The Honor Code prohibits students from submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, plagiarizing papers or materials from the internet and other sources without proper documentation and cheating on exams. The full code is posted at www.studentconduct.umd.edu, students are responsible for its content.

Students with any type of disability that may interfere with learning in this class should negotiate a reasonable accommodation with the instructor early in the semester and be registered with the Student Disabilities Resource Center.