Knowing and Learning in Mathematics and Science

UTCH 3001-01

Semester Hours: 3
Semester/Year: Spring 2014
Instructor: Jennifer Edelman
Office Location: Coliseum 2040
Office Hours: Tuesdays 3:00-5:00; Thursdays 8:30-11:00 & 3:00-5:00;
Fridays 3:30-4:30 Other times may be arranged by appointment.
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Online Support: CourseDen Home Page
https://westga.view.usg.edu/
CourseDen Help & Troubleshooting
http://www.westga.edu/~distance/webct1/help
Ingram Library Services
http://westga.edu/~library/info/library.shtml
University Bookstore
http://www.bookstore.westga.edu/

COURSE DESCRIPTION
The goal of this course is to develop a powerful tool kit of approaches to knowing and learning in mathematics and science. This course focuses on issues of what it means to learn and know science and mathematics. What are the standards for knowing we will use? How are knowing and learning structured, and how does what we know change and develop? For the science and mathematics educator, what are the tensions between general, cross-disciplinary characterizations of knowing (e.g., intelligence) and the specifics of coming to understand powerful ideas in mathematics and science? What are the links between knowing and developing in learning theory, and the content and evolution of scientific ideas? What are the connections between kinds of assessments and theories of knowing? How are various uses of technology associated with specific approaches to learning? Also, current issues and tensions in education will be discussed, especially as they relate to mathematics and science instruction.

CONCEPTUAL FRAMEWORK
The conceptual framework of the College of Education at UWG forms the basis on which programs, courses, experiences, and outcomes are created. With the goal of Preparing Exemplary Practitioners, our programs incorporate ten descriptors (knowledgeable, reflective, inquisitive, decisive, adaptive, proactive, leading, collaborative, culturally sensitive, empathetic), clustered into three interrelated and overlapping themes, that demonstrate our commitment to (a) Professional Excellence; (b) Field-Based Inquiry; and (c) the Betterment of Society. These themes and descriptors are integral components of the conceptual framework and provide the basis for developing exemplary practitioners who are prepared to improve schools and communities. National and state standards (INTASC, NBPTS, Learned Societies) also are incorporated as criteria against which candidates are measured.
The mission of the College of Education is to provide excellence in the initial and advanced preparation of professionals for a variety of settings, to foster an innovative learning community, and to empower a faculty committed to teaching and the dissemination of knowledge. This course’s objectives, activities, and assignments are related directly to the conceptual framework and national standards, as identified below.

**APPROACHES TO INSTRUCTION**

The instructor of this course will employ a variety of instructional strategies in teaching the content of this course. Those strategies include but are not limited to: guided discussion, modeling and simulations, cooperative and collaborative grouping, student presentations, and hands-on activities that actively engage students in the learning process.

Readings and discussions are a significant component of this course. Students can expect to devote 6 or more hours per week outside of class to complete the assigned readings and responses. Class discussions and activities are structured, in part, by these responses.

**Course Prerequisite(s):** Successful completion of Step 1 and Step 2 AND an interest in exploring teaching and learning in-depth.

NOTE: Students must use a word processor and E-mail, and have access to a web browser. Presentations, if applicable, must be submitted in advance as PowerPoint files

**TEXTS, READINGS, INSTRUCTIONAL RESOURCES, AND REFERENCES**

**Required Text(s)**
None. Readings and materials will be provided on CourseDen.

**Additional Requirement(s)**

Tk20 Subscription (A course assignment is linked to TK-20.) This is available at the University Bookstore or at http://westga.tk20.com/campustoolshighered/start.do.

If you have purchased a subscription previously, DO NOT re-subscribe. For more information about this resource, see http://www.westga.edu/coe/index_550.php. For assistance, email tk20@westga.edu. You are required to submit your final project on TK-20 AND CourseDen as the program requirement. TK-20 will be used for the remainder of your COE classes in the UTeach program. A subscription purchased through the COE website is $100 and is good for 10 years.
## COURSE OBJECTIVES

### Course Objectives and Evidence of Student Learning

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<th>Students will be able to…</th>
<th>Evidence of Student Learning:</th>
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| Construct models of knowing and learning to guide classroom practice. | • Meaningful contributions to class discussions and activities  
• Reading responses  
• Expert/novice interviews, midterm exam, and final project |
| Articulate various standards for knowing science and mathematics and articulate the implications of these standards for assessment, especially standardized assessment. | • Meaningful contributions to class discussions and activities  
• Reading responses  
• Expert/novice interviews, midterm exam, and final project |
| Articulate what it means to know and learn relative to cognitive structures and describe how what people know changes and develops. | • Meaningful contributions to class discussions and activities  
• Reading responses  
• Expert/novice interviews, midterm exam, and final project |
| Describe various paradigms for evaluating science and mathematics understanding. | • Meaningful contributions to class discussions and activities  
• Reading responses  
• Expert/novice interviews, midterm exam, and final project |
| Use the clinical interview method to make sense of someone's reasoning about a topic in science or mathematics. | • In-class interview experience and reflection  
• Novice/expert interview report including transcription and analysis |
| Express informed opinions on current issues and tensions in education, especially as they relate to mathematics and science instruction. | • Meaningful contributions to class discussions and activities  
• Reading responses  
• Expert/novice interviews, midterm exam, and final project |
ASSIGNMENTS, EVALUATION PROCEDURES, AND GRADING

Assignments and core requirements: Written assignments are final products that will be graded on both what is written (clarity, depth, insight) and how it is written (the form of the written work). Therefore, it is crucial to realize that correct grammar and spelling, proper punctuation, neatness, and adherence to assignment guidelines will affect your grade. As an educator, you will be expected to demonstrate high levels of competence not only in verbal but also in written communication with parents, administrators, and other educators. Evaluation of written assignments will be accomplished through rubrics, which will be distributed as assignments are given. All assignments must be completed in a typed, double space format, with Times/Times New Roman font, size 12 and 1.5-inch margins on all sides unless otherwise indicated.

Course Papers and Projects are due by 11:59 p.m. on the designated date. Due dates are listed on the course schedule; full instructions for each assignment are posted on CourseDen. Assignments are to be typed and submitted to the appropriate dropbox on CourseDen (except for the final project which will also be turned in on TK20). The dropboxes will close at 11:59 p.m. on the Thursday before class. Late papers and projects will have their grades reduced by 10% for each day they are late. Please do not wait until the last minute to upload your assignments; technical/computer issues will not excuse the lateness of the assignment. Your final paper must be turned in on both CourseDen and Tk20 on the due date in order to receive credit.

Assignments: This is a brief overview of how you will demonstrate your learning in this course. Each assignment will have further instructions posted in CourseDen and will be discussed in class.

1. Professional Conduct: Each student is expected to follow the guidelines for professional conduct as spelled out in this syllabus and in the PLC charter they develop. Each member of the PLC will evaluate themselves and each other.

2. Reading Responses: Because our activities will be centered on the analysis and application of the ideas we read, you will be completing a reading response activity for each theory reading. Reading responses are due by 11:59 p.m. on the Thursday before we discuss the readings in class. Late reading responses will count as 75% of an on-time entry (50% if submitted a week or more late). Please check the course outline for assigned readings and due dates.

3. Novice/Expert Interview: As an application of what you learn in this course, you will be asked to engage a Novice/Expert pairing in a problem-based interview on a topic of your choice. This assignment will be practiced and scaffolded in class before you work on it independently.

4. Midterm: This is a comprehensive mid-term exam, sampling from all that we have read, discussed, and experienced to date. The exam will be completed in-class, with an individual and PLC portion.

5. Mathematics/Science PLC Activities: Each PLC will have a combination of mathematics and science majors. Mathematics majors will read the assigned “mathematics” articles and science majors will read the assigned “science” articles.
a. **Concept Maps:** You will also be creating a concept map of the learning theories we discuss in this course. For each theory, your PLC will identify 5 key elements and their application to teaching and learning in today’s secondary classrooms (from the assigned mathematics and science articles).

b. **10-minute Misconception Teach:** In your PLC, you will identify a common misconception that students may have in one discipline. You will give a brief presentation/lesson (10 minutes) to introduce and “fix” that misconception with your peers.

c. **Final project:** Students are expected to collaborate with their PLC to produce, teach, and reflect on a standard-based lesson using pre/post assessments and literature from this course to inform their lesson planning and instruction. A group paper and presentation of the paper are also included in the final project.

### Evaluation Procedures

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<tr>
<th>Assignment</th>
<th>Points</th>
<th>Assessment Tools</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>1. Professionalism</td>
<td>100</td>
<td>Peer Evaluation Rubric</td>
<td>Fridays 1:00-3:30</td>
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<td>2. Reading Responses</td>
<td>100</td>
<td>Rubric</td>
<td>Thursdays, 11:59 p.m.</td>
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<tr>
<td>3. Theory Concept Maps</td>
<td>100</td>
<td>Rubric</td>
<td>Done in-class</td>
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<tr>
<td>5. 10-minute Misconception Teaches</td>
<td>100</td>
<td>Rubric</td>
<td>Sign-up date</td>
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<td>Part 2-Jan 31</td>
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<td>Part 3-February 21</td>
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<td>7. Midterm</td>
<td>200</td>
<td>Exam</td>
<td>March 7</td>
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<td>8. Final Project</td>
<td>200</td>
<td>Rubric</td>
<td>April 24, 11:59 p.m.</td>
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<td>(paper); April 25</td>
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<td>(presentations)</td>
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**Grading**

900-1000 points = A  
800-899 points = B  
700-799 points = C  
699 or fewer points = F

### CLASS, DEPARTMENT, AND UNIVERSITY POLICIES

**Americans with Disabilities Act:** Students with a documented disability may work with UWG Accessibility Services to receive essential services specific to their disability. All entitlements to accommodations are based on documentation and USG Board of Regents standards. If a student needs course adaptations or accommodations because of a disability or chronic illness, or if he/she needs to make special arrangements in case the building must be evacuated, the student should notify his/her instructor in writing and provide a copy of his/her Student Accommodations Report (SAR), which is available only from Accessibility Services. *Faculty cannot offer accommodations without timely receipt of the SAR; further, no retroactive accommodations will be given.*
**Professional Conduct:** As teachers you have made a commitment to the education profession. As such, you should conduct yourself at all times in a professional manner. You will demonstrate your professionalism through the following behaviors:

**Attendance and punctuality**
Much of the value of the course will be through the experiences that occur during our class sessions. You must be present to learn, and to contribute to the learning of others. If you must be absent, please notify the members of your PLC. Missing class sessions, arriving late to class, and/or leaving early will negatively impact your professionalism grade for the semester.

**Active participation**
To learn anything more deeply, you must actively participate in it. The pedagogy being advocated and modeled through our course is the belief that our students must commit to, and be involved actively in, the problems and situations being posed. Be involved. Developing collegial, supportive relationships is an important aspect of the teaching profession.

**Use of laptops, cell phones, and tablets**
Teachers must learn to manage and incorporate technology in their classrooms. We will use laptops, cell phones, and tablets for specific course-related activities (e.g., composing notes, using math applets/excel/or other tools, looking up information as necessary, preparing mini-presentations). In general, you should not engage in web browsing, email, or other questionable unrelated activities during class time. Texting is not a course-related activity unless we are using Poll Everywhere.

**UWG Email Policy:** University of West Georgia students are provided a MyUWG e-mail account. The University considers this account to be an official means of communication between the University and the student. The purpose of the official use of the student e-mail account is to provide an effective means of communicating important university related information to UWG students in a timely manner. It is the student’s responsibility to check his or her email.

**Credit Hour Policy:** The University of West Georgia grants one semester hour of credit for work equivalent to a minimum of one hour (50 minutes) of in-class or other direct faculty instruction AND two hours of student work outside of class per week for approximately fifteen weeks. For each course, the course syllabus will document the amount of in-class (or other direct faculty instruction) and out-of-class work required to earn the credit hour(s) assigned to the course. Out-of-class work will include all forms of credit-bearing activity, including but not limited to assignments, readings, observations, and musical practice. Where available, the university grants academic credit for students who verify via competency-based testing, that they have accomplished the learning outcomes associated with a course that would normally meet the requirements outlined above (e.g. AP credit, CLEP, and departmental exams).
University of West Georgia Honor Code: At the University of West Georgia, we believe that academic and personal integrity are based upon honesty, trust, fairness, respect, and responsibility. Students at West Georgia assume responsibility for upholding the honor code. West Georgia students pledge to refrain from engaging in acts that do not maintain academic and personal integrity. These include, but are not limited to, plagiarism, cheating, fabrication, aid of academic dishonesty, lying, bribery or threats, and stealing. The University of West Georgia maintains and monitors a confidential Academic Dishonesty Tracking System. This database collects and reports patterns of repeated student violations across all the Colleges, the Ingram Library, and the School of Nursing. Each incidence of academic dishonesty is subject to review and consideration by the instructor, and is subject to a range of academic penalties including, but not limited to, failing the assignment and/or failing the course. Student conduct sanctions range from verbal warning to suspension or expulsion depending on the magnitude of the offense and/or number of offenses. The incident becomes part of the student’s conduct record at UWG.

Additionally, the student is responsible for safeguarding his/her computer account. The student’s account and network connection are for his/her individual use. A computer account is to be used only by the person to whom it has been issued. The student is responsible for all actions originating through his/her account or network connection. Students must not impersonate others or misrepresent or conceal their identities in electronic messages and actions.

Extra Credit: Extra credit will not be available in this course. Please do your best work on the assigned activities.

Reading References for Knowing and Learning in Mathematics and Science


