The University of Texas at Dallas
Department of Science and Mathematics Education

NATS 3341 Knowing and Learning in Science and Mathematics

Basic Course Information

Course number: NATS 3341 Credit hours: 3
Meeting time:

Course website:
http://elearning.utdallas.edu (Click on Login)
This course will be a hybrid course. We will meet once a week and use eLearning for online activities and discussions.

Instructor Information

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281-728-7472 (cell)

Office hours: upon request

Communication:

We check the course website and course email daily. Please allow us to respond to communications within 24 hours of receipt of your message, though we will make every attempt to do so quickly. Please use the eLearning email to contact us as this helps prevent lost emails. Students often communicate or submit assignments at times that differ from traditional working hours. If you send an email late at night or in the middle of the day, you may not get an immediate response. A response may take some time. If you have an emergency, you may telephone either of us.

Our philosophy of learning

"The mind must be wider than the sky."
This line from poet Emily Dickinson sums up my philosophy of teaching and learning. As your instructors, we hope that you as students will open your minds to learning things that may not necessarily fit in your worldview. We don't ask you to change your views or beliefs, only to accept that people and societies do things differently and that, to them, these things are the "right" way for them. We encourage you to challenge yourselves and me and to challenge others. However, such challenges must be informed and reasoned; pure gut reactions, while valid, because they are what you feel, are not entirely appropriate in a college course.

Learning is creation
We believe in a conception of learning where students are actively engaged in creating new knowledge, not passively waiting for the instructor to impart knowledge. As the instructors, we possess certain knowledge and experience in the disciplines education and math and science, but by no means do we "know it all"! *We can learn from you just as you can learn from us!*

Learning is social
We believe that learning is a social activity, as well as an individual activity. Learning

from others and from the work of others is a critical component of learning. You will have many opportunities to accomplish both kinds of activities in this class. Some activities ask you to work collaboratively with fellow classmates and others ask you to submit work that you have done on your own.

Learning is meaningful
We want this course to be something that matters to you, that relates to your life and that you can use well beyond your enrollment in this course this semester.

Course Details

Course Description

Knowing & Learning seeks to help you develop a powerful tool kit of theory-driven approaches to knowing and learning in science, technology, engineering, and mathematics (STEM). We will explore what it means to learn and know science and mathematics, while broadening our sense of what is possible in educational practice.

Some of the questions that we will address are:

- What standards for knowing can we develop and justify? How are knowing and learning structured, and how does what we know change and develop?
- What are the tensions between general, cross-disciplinary characterizations of knowing (e.g., intelligence or the conditioning of behavior) and specific, disciplinary learning and knowing in STEM?
- How are learning and development related?
- What are the implications of different learning theories for assessment, instruction, and the use of technology?

This course builds on your initial encounters with teaching in the Step courses by providing powerful theoretical lenses with which to analyze knowing and learning. This course also provides foundational understandings for your further development as teacher and designer in Classroom Interactions and Project-Based Instruction.

Course description:

A goal of this course is for participants to develop a powerful tool kit of theory-driven approaches to knowing and learning in mathematics and science. The focus is primarily on issues of what it means to learn and know science and mathematics in a way that is intended to broaden our sense of what is possible in our educational practices. Some of the questions that will be addressed in the course include: What are the standards for knowing we can use? How is knowing and learning structured, and how does what we know change and develop? For science and mathematics educators, what are the tensions between general, cross-disciplinary characterizations of knowing (e.g., intelligence or the conditioning of behavior) 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? A broader and, hopefully, richer sense of what is possible is to support the kind of "power in action" that helps us become ever more effective and creative science and mathematics educators.

Learning Outcomes:

- Students will construct models of knowing and learning to guide classroom practice.
- Students will articulate various standards for knowing mathematics and science and articulate the implications of these standards for assessment, especially standardized

assessment.

- Students will articulate what it means to know and learn relative to cognitive structures and describe how what people know changes and develops.
- Students will describe various paradigms for evaluating science and mathematics understanding.
- Students will use the clinical interview method to make sense of someone's reasoning about a topic in mathematics or science. Students will be able to evaluate science and mathematics content and apply it to the correct learning environment.
- Students will describe the links between knowing and developing in learning theory and the content and evolution of scientific ideas.

Pre-Requisite/Co-Requisites

UTeach - Completion of Step 1 and completion of/or concurrent enrollment in Step 2; An interest in teaching.

Textbook Information

Required texts:

- *How People Learn: Brain, Mind, Experience and School (Expanded Version).* National Research Council, 2005. (Various chapters) Available free in pdf format at http://www.nap.edu/catalog.php?record_id= 9853

- *How Students Learn: History, Mathematics and Science in the Classroom*. National Research Council, 2005. (Various chapters) Available free in pdf format at http://www.nap.edu/catalog.php?record_id=10126

- *Making Thinking Visible*. (2011). Jossey-Bass Publishers. (Available in UT Dallas bookstore).

Grading & Assignments Information

5% Reading Quizzes (drop 1)
10% Clinical Interview 1
20% Clinical Interview 2
10% Midterm Exam
20% Class discussion and participation
35% Learning Design & Enactment Project

A+	97 – 100%	970-1000 pts
A	94 – 96%	940-969 pts
A-	90 – 93%	900-939 pts
B+	87 – 89 %	870-899 pts
B	84 – 86%	840-869 pts
B	80 – 83%	800-839 pts
C+	77 – 79%	770-799 pts
C	74 – 76%	740-769 pts
C-	70 – 73%	700-739 pts
F	= failing	

Grades calculated below 70% will be considered failing.

Checking grades:

You may check your grades at any time on the course website. If you have a question about your grade, please email either of us in eLearning or phone us.

General Description of Assignments:

Teaching Philosophy Statement (included in Discussion and LD&E Report)

The Teaching Philosophy Statement will be part of your UTeach Dallas portfolio (to be completed by the end of your program). In each course, you will collect evidence for the portfolio. In this course, you begin formulating your statement of Teaching Philosophy. We want you to start thinking in a very intentional manner about why you have decided to teach and what drives your teaching. In the end, your statement will answer the following questions in a personal and professional manner:

What led you to become a teacher?
What do you hope to accomplish as a teacher?
What major concepts guide or shape your views on being a good teacher?

Keep in mind that what you write for us in this course may not be exactly what you include in the portfolio. Each course, as well as your experiences in schools will inform your philosophy, which may change over time.

Reading Quizzes (5%)

Reading quizzes are design to help you prepare for class discussion. They cover the readings to be discussed in class. You will take the quizzes online in eLearning. The lowest quiz grade can be dropped at the end of the semester. Quizzes must be completed by noon on Mondays.

Clinical Interviews - (30%)

(detailed rubrics for the interviews can be found on the course website)
You will conduct 2 clinical interviews during the semester. The purpose of these interviews is for you to observe how people think, to determine how thinking is and can be made visible.

Midterm Exam (10%)

The Midterm Exam is an analysis and application of the concepts studied up to this point. It is an academic exercise and as such, assesses your writing and thinking skills in addition to your knowledge of the course concepts. Structure, grammar, spelling and punctuation are important.

Learning Design and Enactment Project (35%)

The Learning Design and Enactment (LD&E) project is the culminating event in Knowing and Learning. It is the design, teaching, and analysis of a math or science lesson. You will be working in groups and will present your lesson to the class as listed on the course schedule. Parts of the project will be completed as a group but the final report is to be an individual report describing the effectiveness of your lesson. Details can be found on eLearning.

Submission and due dates of assignments:

Written assignments are due by midnight on Wednesdays and will be returned by Monday. Please submit written assignments via the course website (use the assignment drop box). Assignments are due as indicated on the class schedule and on the class calendar (on the website). Late assignments are not accepted and the course drop box will not permit you to upload the assignment. You may turn in an assignment late via email - and we will mark it for you, but you will receive a 0 as a grade.

Class discussion and participation (20%)

Attendance, Preparation and Cooperation
In this class, your own learning and that of your classmates depend on attendance (see below), preparation and active involvement in course activities. Thoroughness in preparation for each class session and cooperative involvement in discussion are essential components for successful class participation.

At the end of each week, we ask you to complete an anonymous survey that asks questions about the activities and discussion. This information is important because it will:

1) help us to get to know you
2) help us see what you have learned from the class discussion and class readings
3) allow you to make suggestions on improving the class (what worked? What didn't work?)

Learning Environment / Class Behavior:
As a student in this course, you are expected to comply with Texas Administrative Code (TAC), Title 19, Part 7, Chapter 247, Rule §247.2 – Code of Ethics and Standard Practices for Texas Educators and the UT Dallas Fitness to Teach Policy.

Some topics of discussion may result in lively discussion. Students are expected to conduct themselves in a respectful and appropriate manner.

At the beginning of the semester, we will discuss together and come to an agreement on how our learning (i.e. class) should occur. We'll summarize our decision and this will be posted as our "Guidelines for a Positive Learning Environment".

Note that the instructors have the right to take reasonable measures to ensure a discussion and class environment free of disruptive or incendiary language. We may lock a student out of discussion or deny the student access to the course for disruptive behavior.

UT Dallas Policies

Email communication
The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Academic Integrity
As instructors, we believe that learning is a social activity, as well as an individual activity. Learning from others and from the work of others is a critical component of learning, particularly in course on communication. You will have many opportunities to accomplish both kinds of activities in this class. Some activities ask you to work

collaboratively with fellow classmates and others ask you to submit work that you have done on your own. For all work, we expect that you respect the academic integrity of the work of others, as you expect others to respect your own work. Please review the UT Dallas website on Academic Integrity and Dishonesty at http://www.utdallas.edu/deanofstudents/integrity/. It describes cheating, plagiarism, and collusion, the most common types of violations, and very importantly, the penalties. And check out this online resource that explains plagiarism in an innovative (and understandable) way. It's actually quite cool!
http://www.cte.usf.edu/plagiarism/plag.html
If you have any questions, post on the discussion board or email us.

Withdrawal Policy
The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievances
Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures.
In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grades
Per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services
The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30

a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:
The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

The law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. **It is the student's responsibility to notify his or her professors of the need for such an accommodation.** Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Syllabus Change:

While every attempt has been made to prepare this syllabus and class schedule in final form, it will be the instructors' prerogative to make any changes as may be deemed necessary in order to meet the learning outcomes of the course. Students will be notified in writing of any change.