

EDUT 3370.060
KNOWING AND LEARNING IN MATHEMATICS AND SCIENCE
Fall 2026

Section:	3370.060	Instructor:	Brandon L. Bretl, PhD
Days:	asynchronous	Email:	bbretl@uttyler.edu
Times:	asynchronous	Phone:	903-566-7390
Location:	ONLINE	Office:	BPE 246
		Office Hrs:	MW 11:00 am – 1:00 pm (or upon request)

Course Description

What does it mean to *know*? How does learning change what we know? And how can educators use answers to these questions to optimize student outcomes in math and science? This course focuses on theories of knowing and learning in mathematics and science with special considerations for educators. Ideas related to general intelligence, understanding, human development, and the more specific content, evolution, and use of scientific ideas are investigated and applied. The course also looks at current tensions and debates in mathematics and science instruction with an emphasis on perspectives from educational psychology and human development.

Required Textbook

All readings provided through Canvas.

Student Learning Outcomes

Objective	Texas Educator Standard	InTASC Standard
Construct models of knowing and learning to guide classroom practice.	1.2, 2.1, 2.2,2.3, 4.1	1
Apply understanding of developmental perspective on knowing and learning in classroom practices.	1.3, 2.1, 2.2, 2.3, 4.1	2

Apply foundational knowledge of testing, measurement, and classroom assessment to classroom practice.	1.1, 1.2, 1.3, 5.1, 5.3, 5.4	6
Express informed opinion on current issues and tensions in education, especially as they relate to mathematics and instruction.	3.2, 3.3, 6.1, 6.2, 6.3, 6.4	9, 10

Course Policies and Expectations

Civility

I expect everyone to approach others in class with a sincere intention to treat one another fairly and respectfully. We are all here to learn. I will give you that chance, and I expect you give me and your classmates that chance as well. This includes treating everyone with respect and kindness. If at any time during the semester you feel uncomfortable, please let me know. I can either address the issue or refer the issue to the appropriate resources on campus. Expressions or actions that disparage a person's or group's race, ethnicity, gender, gender identity, religion, sexual orientation, marital status, parental status, age, or disability are contrary to the mission of the course, department, and university and will not be tolerated.

Course Environment & Attendance

This course is face-to-face with assignments submitted and additional resources available through Canvas. For issues with Canvas, please contact itsupport@patriots.utttyler.edu. Attendance at lectures is mandatory for this course. Unexcused absences from class decrease your participation grade by ten points per absence.

Written Assignments

All written assignments should be typed (double-spaced, Times New Roman, 12-point font) and submitted by midnight Central Standard Time on the due date. All written assignments should be submitted through the assignment link that I will provide. Please name written assignments using

the following convention: last name, first initial, assignment title (ex. Last_F_Assignmenttitle). Late assignments will not be accepted and will receive a score of 0. Assignments completed for other courses may NOT be turned in for this course and will be considered academic dishonesty.

For general guidance about writing in my class, see this scene from the film "A River Runs Through It" <https://www.youtube.com/watch?v=gA-sEfXOaEQ>

Artificial Intelligence Policy (AI Policy)

UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course, you can use AI programs (ChatGPT, Copilot, etc.). These programs can be powerful tools for learning and other productive pursuits, including completing assignments in less time, helping you generate new ideas, or serving as a personalized learning tool. However, your ethical responsibilities as a student remain the same. You must follow UT Tyler's Honor Code and uphold the highest standards of academic honesty. This applies to all uncited or improperly cited content, whether created by a human or in collaboration with an AI tool. If you use an AI tool to develop content for an assignment, you must cite the tool's contribution to your work.

Contacting Dr. Bretl

Email is the best way to reach me. I make every effort to respond to emails within 24 hrs.

Student Assignments & Projects

The course is designed to be delivered in a "module format." Course materials will be organized into weekly modules. Each module will usually consist of readings, quizzes, classroom activities/discussion prompts, written assignments, and other activities. Each week will follow a relatively consistent pattern.

Readings

Readings will consist of chapters from the textbook and supplemental readings from research papers, books, and other textbooks provided on Canvas. It will be important that you complete assigned readings on time so you are prepared to participate in lectures and discussions. I also often provide enrichment materials that are optional but will provide a more in-depth or challenging perspective on a topic for those students who want to dig deeper into an area of interest.

Lectures

Be sure to come to lectures prepared to participate. Classes are an hour and twenty minutes and get very boring for me and everyone else when I'm the only one talking.

Quizzes

There will be several short quizzes in the semester (roughly one per chapter). These will be delivered online and will serve to provide a check of your understanding. The quizzes will also

provide you with an idea of the types of questions you may see in the tests). Late quizzes will not be accepted and will receive a score of 0.

Essays

You will be required to write three short essays (less than 2 pages) on prompts from the class. Additional information will be provided on these assignments in the course.

Self-Reflections

Research shows that metacognition (the ability to reflect on study success and make changes) is critical for success in college. As such, I will be asking you to complete several low-stakes reflections designed to increase metacognitive ability. I will provide information about these assignments later in the semester. Late self-reflection assignments will not be accepted and will receive a score of 0.

Class Participation

You are expected to participate in class in a meaningful way. You will receive points for participation at the end of the semester. If I notice you are not participating, I will reach out to let you know you are at risk of losing points and will help you with some strategies to help you become more comfortable speaking out in class.

Research Groups

We will split into “research groups” based on our interests and will complete some group assignments based on these groups. You will also be expected to support one another and answer general questions for one another to support success in the course.

Research Pool Requirement

Students enrolled in specified SOE courses must fulfill a research pool requirement each semester. The research requirement for these courses can be satisfied in one of two ways. First, students can fulfill the research pool requirement by volunteering to participate in approved research studies offered by the School of Education. Alternatively, students can satisfy the research pool requirement by completing alternative assignments that are equal in time and effort to the research opportunities.

Clinical Interview

Across the semester, students are expected to satisfactorily complete one Clinical Interview with an expert and a novice on a specific topic. The clinical interview is an extensive process of formally interviewing subjects engaged in some type of problem-solving activity (e.g., a pre-med student and a surgeon with twenty years of experience). You will record the interview, transcribe, and analyze the problem-solving activity. The clinical interview should be typed and submitted by midnight Central Standard Time on the due date. Clinical interviews turned in after the deadline will receive a score of 0.

Due Dates & Points

Due dates will be provided on Canvas for all assignments.

Final Day to Withdraw

The final day to withdraw from the course is October 30, 2026

Grade Item	Total Points
Quizzes	5 points each X 10 quizzes = 50 total
Essays	30 points each x 3 = 90 total
Classroom Participation	50 points
Research Group Planning	10 Points
Self-reflection activities	10 points each x 3 reflections = 30 points total
Research Pool Requirement	50 points
Clinical Interview	125 points

Course Total	Approximately 405 points
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Please note: The number, content focus, and point value of all assessments and assignments is an approximation and may change.

Letter Grades

A: 90.00% of points or above

B: 80.00% -89.999% of points

C: 70.00% - 79.999% of points

D: 60.00% -69.999% of points F: 59.999% of points or below

Course Topics Outline

Week	Topics	Notes
1	Introductions	
2	Behavioral Perspectives	
3	Sensory & Working Memory	
4	Cognitive Load, Long-term Memory	
5	Social Cognitive Theories	
6	Self-regulation, emotion	
7	Metacognition, expert knowledge	
8	Conceptual change, constructivism	
9	Neural Development	
10	Piaget	
11	Vygotsky	
12	Maslow, goal achievement theories	
13	Attribution theory, expectancy	
14	Thanksgiving Holiday	
15	Misconceptions	
16	Final Exams	

Note: These topics and timeline are subject to change.

UT Tyler Resources for Students

- ☐ UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu, <http://www.uttyler.edu/writingcenter/>
- ☐ UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu, <https://www.uttyler.edu/tutoring/>
- ☐ The Mathematics Learning Center, RBN 4021, This is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- ☐ UT Tyler Counseling Center (903.566.7254) <https://www.uttyler.edu/counseling/>

Assessment and Standards Matrix

Learning Outcomes	Activities	Assessment	Standards
Understand, compare, critique, and apply key theories of learning and development	Evaluate sample students Small Group Discussions Role Plays	Quizzes Essays Case Study Project	TES: 1Ai-iii; 1Bi-ii; 1Cii-iii; 1Di; 1Fi-iii; 2Bi-iii; 2Ci-ii; 3Ai-iii; 3Bi- iii; 3Ci; 4Ai-ii; 4Bi-ii; 4Cii-iv; 4Dii-iv; 5Ai-ii; 5Bi-iii; 5Ci-ii; 6Ai-iii;6Bi-ii; 6Dii-iii ISTE: 1b, 1c INTASC: 1, 2, 3, 4, 5, 8, 9, 10 PPR: EC-12 I, II, III
Understand, synthesize, and apply key constructs in cognition and motivation	Evaluate Sample Students Role Plays Small group discussions	Quizzes Essays Case Study Project	TES: 1Ai-iii; 1Bi-ii; 1Cii-iii; 1Di; 1Fi-iii; 2Bi-iii; 2Ci-ii; 3Ai-iii; 3Bi- iii; 3Ci; 4Ai-iii; 4Ci-iii; 4Dii-iv; 5Ai-ii; 5Bi-iii; 5Ci-ii; 6Ai-iii;6Bi-ii; 6Dii ISTE: 1b, 1c, 2c, 3b INTASC: 1, 2, 4, 7, 8 PPR: EC-12 I, II, III
Identify, understand, and use individual difference and contextual factors to promote student learning.	Role Plays Classroom Activity Development Activities Evaluate Sample Students	Quizzes Essays Case Study Project	TES: 2Bi-iii; 2Ci-ii; 3Ai-iii; 3Bi- iii; 3Ci; 4Ai-ii; 4Bi-ii; 4Cii-iv; 4Dii-iv; 5Ai-ii; 5Bi-iii; 5Ci-ii; 5Di-ii; 6Ai-iii;6Bi-ii;6Dii-iii STE: 1a, 1b, 1c, 1d, 2a, 2b, 3b INTASC: 3, 4, 5, 6, 7 PPR: EC-12 III, IV
Analyze and develop classroom scenarios that apply principles of educational psychology to promote student learning	Role Plays Classroom Discussions Evaluate Sample Students	Quizzes Essays Case Study Project	TES: 1Ai-iii; 1Bi-ii; 1Cii-iii; 1Di; 1Fi-iii; 2Bi-iii; 2Ci-ii; 3Ai-iii; 3Bi- iii; 3Ci; 4Ai-ii; 4Bi-ii; 4Cii-iv; 4Dii-iv; 5Ai-ii; 5Bi-iii; 5Ci-ii; 6Ai-iii;6Bi-ii; 6Dii-iii ISTE: 1b, 1c INTASC: 1, 2, 3, 4, 5, 8, 9, 10 PPR: EC-12 I, II, III

Core Purpose of School of Education:

The School of Education prepares educators and leaders who transform lives through learning. Through excellence in teaching, scholarship, innovation, and partnership, we strengthen the educator workforce, advance educational opportunity, and improve outcomes for learners, schools, and communities across East Texas and beyond.

UNIVERSITY POLICIES

UT Tyler Honor Code

Every member of the UT Tyler community joins together in saying: I embrace honor and integrity. Therefore, I choose not to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit <http://www.uttyler.edu/tobacco-free>

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (Stewart Hall 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- ☐ Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- ☐ Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date) Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- ☐ Being reinstated or re-enrolled in classes after being dropped for non-payment
Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Tyler at Texas offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including non-visible a diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit

<https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with an Accessibility Case Manager. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Teacher prep Standards

The Texas Education Agency adopts the repeal of §149.1001 and new §149.1001, concerning teacher standards. The repeal of §149.1001 is adopted without changes to the proposed text as published in the March 7, 2025 issue of the *Texas Register* (50 TexReg 1754) and will not be republished. New §149.1001 is adopted with changes to the proposed text as published in the March 7, 2025 issue of the *Texas Register* (50 TexReg 1754) and will be republished. The adopted repeal and new rule reflect alignment with recent updates to State Board for Educator Certification (SBOE) rules in 19 TAC Chapter 235, Subchapters A-D, as required by House Bill (HB) 1605, 88th Texas Legislature, Regular Session, 2023.

REASONED JUSTIFICATION: Section 149.1001 identifies the performance standards to be used to inform the training, appraisal, and professional development of Early Childhood-Grade 12 pre-service and in-service teachers in Texas.

The adopted repeal of and new §149.1001 aligns with recent updates to SBEC rules in 19 TAC Chapter 235, Subchapters A-D, as required by HB 1605.

The adopted repeal of and new §149.1001 reflects a reorganization of the teacher standards and also includes definitions that provide clarity for educators and promote a common understanding of terms used within the updated teacher standards.

The standards included in adopted new §149.1001 outline the necessary knowledge and skills related to instructional preparation, instructional delivery and assessment, content pedagogy for all teachers and for teachers leading English language arts and reading and math classes, learning environments, and professional practices and responsibilities.

Based on public comments regarding the need for these standards to be closer aligned to recently revised 19 TAC §235.2 and §235.21, modifications have been made at adoption throughout the rule to ensure language in §149.1001 reflects the language in §235.2 and §235.21.

Based on public comment related to the implementation of new §149.1001, subsection (d) was added at adoption to specify that new §149.1001 will be implemented beginning with teacher evaluations conducted after the next update of 19 TAC Chapter 150, Commissioner's Rules Concerning Educator Appraisal, and that evaluations conducted before that time are subject to the requirements as they existed prior to August 17, 2025.

SUMMARY OF COMMENTS AND AGENCY RESPONSES: The public comment period on the proposal began March 7, 2025, and ended April 7, 2025. Following is a summary of public comments received and agency responses.

Comment: An educator commended efforts to incorporate research-based practices and modernize instruction in the proposed revisions but expressed concern that the proposal poses several issues that undermine teacher autonomy, devalue traditional literacy practices, overload educators with unrealistic expectations, and ignore the critical need for sustainable workload management.

Response: The agency disagrees and provides the following clarification. The standards implement three key pieces of legislation related to the training requirements for certified teachers in Texas. They outline the knowledge and skills necessary to demonstrate proficient use of open educational resource instructional materials (HB 1605), skilled application of instructional strategies to educate all students (HB 159, 87 Texas Legislature, Regular Session, 2021), and an understanding of best instructional practices in digital literacy (Senate Bill 226, 87 Texas Legislature, Regular Session, 2021).

Comment: An educator expressed concern with the current school calendar and proposed a trimester model that supports a 4-day week to ensure educators and students receive adequate time for planning, rest, and recuperation.

Response: This comment is outside the scope of the proposed rulemaking.

Comment: The Texas State Teachers Association (TSTA), Texas American Federation of Teachers (Texas AFT), and Texas Coalition for Educator Preparation (TCEP) expressed support for the revised teacher pedagogy standards