

MTED 5322 / ELED 4310
Pedagogical Content Knowledge in Teaching Mathematics
(Strengthening Mathematical Pedagogy in Quantitative reasoning)
cross listed with ELED 4310 Mathematics Methods

FALL 2018

Course Instructor

Dr. Olga Kosheleva, Associate Professor
Education Building Office 801 D
(915) 747-7588
olgak@utep.edu
Office Hours: EDUC 402 Thursday, 4:00 – 5:30 pm, 8:20 – 9:20 pm or by appointment

Course Information

This class will meet in Educ. 402, 5:30 – 8:20 pm.

Relationship to the Conceptual Framework

The course adheres to the College of Education's mission and vision addressing the culture of inquiry through a sustained, comprehensive, and coherent program of study with special emphasis and support for student learning and development within linguistically and culturally diverse settings. The course emphasizes the building of a knowledge base, generation and dissemination of best mathematics education practices and its applications to teaching children in formal and informal settings. All these being part of the driving force from the mission, vision, belief, ethics, and values of the College of Education at the University of Texas at El Paso. Of particular importance within the conceptual framework is the overarching theme of "Proudly Shaping a Better Tomorrow." The course's goal is to equip students with a wide array of effective approaches to teaching and learning mathematics that they will implement in their professional career.

Recommended Readings and other Instructional Resources

Complementary website for a great book used in Math Methods classes: Van de Walle, John A. *Elementary and Middle School Mathematics: Teaching Developmentally*. 6th Edition. Longman. It provides "Blackline Masters" (manipulatives that can be used in your teaching), links to other useful websites and activities.

This website should be the main source for your Internet resources for mathematical activities.

http://wps.ablongman.com/ab_vandewalle_math_6

The following websites provide a wide selection of virtual manipulatives for teaching mathematics (sometimes available in both, English and Spanish):

<http://nlvm.usu.edu/en/nav/vlibrary.html>

<http://www.shodor.org/interactivate/activities/>

<http://www.internet4classrooms.com/index.htm>

Book "How Students Learn: History, Mathematics and Science in the Classroom"

(2005). You can read it online (this site also allows you free download of this e-book) at http://www.nap.edu/catalog.php?record_id=10126

Book “Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity.” You can read it online (this site also allows you free download of this e-book) at http://www.nap.edu/catalog.php?record_id=12519

Book "Adding It Up: Helping Children Learn Mathematics". You can read it online (this site also allows you free download of this e-book) at <http://books.nap.edu/books/0309069955/html/>

Texas Essential Knowledge and Skills (TEKS) <http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111a.html>

TEXES preparation manuals <http://cms.texas-ets.org/texas/prepmaterials/>

National Council for Teachers of Mathematics (NCTM) standards <http://www.nctm.org/>

NCTM curriculum focal points <http://www.nctm.org/focalpoints/>

Texas State University System Mathematics for English Language Learners Project <http://www.tsusmell.org/>

NCTM Illuminations: <http://illuminations.nctm.org/>

Early Algebra: www.ase.tufts.edu/education/earlyalgebra/default.asp

Annenberg Media: <http://www.learner.org/index.html>

Mathematics Toolkit (2001): <http://www.utdanacenter.org/mathtoolkit/>

Texas Education Agency (STAAR Released Tests): http://tea.texas.gov/student.assessment/STAAR_Released_Test_Questions/

UTEP Library Electronic Databases

Course Learning Outcomes/Goals

The course’s learning outcomes will require the student to acquire throughout the semester new knowledge and skills and build upon them. The following table provides a list of the most relevant student learning outcomes for the course.

Table 1. Student learning outcomes and assessment

	Student Learning Outcomes	Assessments
	<i>By the end of course, the successful student will be able to:</i>	<i>To evaluate these outcomes, the faculty member will use the following assessment procedures:</i>
1.	Deepen understanding of numbers, multiple	Class discussions and presentations.

	ways of representing numbers, relationships among numbers, and number systems.	
2.	To deepen understanding of meanings of operations and procedures, and how they relate to one another.	Class discussions and presentations.
3.	To understand connection between measurement and geometry concepts and multiple ways of representing numbers, relationships among numbers, and number systems.	Class discussions and presentations.
4.	To understand the cognitive processes that result in effective learning and teaching of mathematical content.	Class discussions and presentations.
5.	To create successful learning environments in mathematical classroom.	Class discussions and presentations.
6.	Develop an understanding of current issues, practices and directions in mathematics curriculum and the ability to inquire into these.	Class discussions and presentations.
7.	Improve his/her capacity to think reflectively and creatively about their teaching of mathematics.	Class discussions and presentations.
5.	Increase confidence to teach mathematics.	Class discussions and presentations.
6.	Improve their ability to manage and assess their pupils' mathematics learning. Discover innovative methods of instruction to increase effectiveness and pupils' engagement, learning, and thinking.	Class discussions and presentations.
8.	Increase their capacity to become an agent of change in the field of mathematics education.	Class discussions and presentations.
9.	Develop knowledge and strategies to design curriculum at classroom and school levels.	Class discussions and presentations.

7.	Solve and interpret inferential problems using hypothesis testing and estimation about the mean for factorial designs (two-way ANOVA) using the data set provided by the instructor	<ul style="list-style-type: none"> a. Course graded chapter assignments, b. Class discussion of statistical techniques which have direct application in educational settings and contexts, and c. Text unit quizzes and chapter exams. d. Individual conference time about course project-continues
8.	Solve and interpret inferential problems using one linear and multiple regression models hypothesis testing and estimation using the data set provided by the instructor.	<ul style="list-style-type: none"> a. Course graded assignments, b. Group discussion sessions, and c. Individual discussion on course project
9.	Solve and interpret inferential problems using analysis of covariance procedures in educational data. Analyzed real data for course project and start interpreting findings	<ul style="list-style-type: none"> a. Course Grade Assignments, b. Class discussion of statistical techniques which have direct application in educational settings and contexts, and c. Application: Data analysis and interpretation brief reports on PALS data set using SPSS. (other data sets may be allowed)

10	Differentiate between the different types of parametric and non parametric measures of relationship and association including chi-square procedures for frequency data. Interpret and write final report	<ul style="list-style-type: none"> a. Course grade assignments, b. Group discussion sessions and presentation, and c. Final report for course project
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Academic Integrity

It is expected that work you submit will represent your own effort (or your own group’s effort, if it is a group project), will not involve copying from or accessing unauthorized resources or people (e.g., from a previous year’s class), and will appropriately acknowledge allowable references that you do consult. If, in future, in your articles and grant submissions you will be using ideas developed and presented by other students in this class, you are required to appropriately acknowledge their contributions. Violations are unacceptable and will be referred to the Dean of Students Office for possible disciplinary action. Don’t resubmit work completed for other classes without specific acknowledgment and permission from me.

If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per UTEP catalog policy. Refer to <http://www.utep.edu/dos/> for further information. In addition, you may also see the Regent Rules and Regulations at <http://www.utsystem.edu/bor/rules/>

The following is a website provides a brief overview of how to accurately cite sources:
<http://www.bedfordstmartins.com/online/citex.html>

Inclusiveness and equity

Learning happens only when we feel respected as a whole human being. My top priority in our classroom is to cultivate relationships of trust and respect and a sense that we see each other as whole, complex human beings. That you experience this in our classroom is important for the sake of your learning in our course and for the sake of your future students’ learning, so that you feel able to cultivate such relationships with them. To that end, I want you to know that all of you is welcome in our classroom space—all the parts of you as a person are welcome in our discussions, our activities, our assignments, and in our assessments. We are all complex people with a variety of perspectives, experiences, challenges, assets, and resources—our gender identities, our sexual orientations, our religions, our races, our ethnicities, our economic statuses, our immigration statuses, our parenthoods, our veteran statuses, our ages, our languages, our abilities and disabilities. All the parts of you are welcome in our learning community to the extent that you feel comfortable bringing them in. I strive to show respect for the variety and wholeness in each of you, and I expect that each of you shows respect for each other as well. If you feel marginalized in our class, and you feel comfortable discussing it, I would like to know so that I can support you, protect you, and make changes that feel more inclusive and equitable. You can also talk with our Department Chair and/or you can report a complaint of discrimination to the University’s Equal Opportunity Office, Kelly Hall, Third Floor, 915-747-5662 oreoaa@utep.edu.

Course requirements, assignments, examination

Course Policy/Requirements

To be successful in this course, class functionality, assignments and activities rely heavily on your early understanding of expectations. You are also responsible for doing all the work and going over your readings and completing assignments the. These courses take as much, if not more time than traditional classes.

Please check course announcements/emails every day to keep yourself abreast of any changes in course content and deadlines.

1. It is required that you have a UTEP e-mail. You must use your UTEP email account for all correspondence related to this course and check it regularly to ensure that you receive important messages about the course on a timely basis. If you are enrolled in this course, you already have an email account created for you. If you do not remember your UTEP email address and password, please call 915-747-5257 or go to "<https://newaccount.utep.edu/>";
2. Mandatory file formats: all text attachments you upload to assignments, discussion postings, or email messages must be MS Word documents (.doc, .docx or .rtf); all images should be in JPEG Format (.jpg); if you send your work in a file, its name should always include week submission number and your name (last and first name).
3. The general format used by papers in this course is APA version 6.
4. It is responsibility of any student desiring to drop the course to turn in all the necessary drop forms. The instructor will not drop students who are no longer attending the class.
5. The instructor reserves the right to drop students who have not adequately participated during two weeks of class (face-to-face or ONLINE). The instructor can drop any student any time a student violates the written rules/requirements for remaining in good standing in the course.

Students will be required to:

- Actively participate in class assignments, quizzes and presentations (in Math Camp, and in class sessions).
- Read assigned pages in the chapters and materials provided on BlackBoard and/or distributed in class.
- Complete and submit via BlackBoard email and/or Discussion Forum individual reflections, lesson plans and Final Reflection paper (in required formats).
- Please ensure that you carefully read all instructions for each assignment, particularly the due dates and times. Reading instructions is your responsibility and you should not assume due dates or times.
- Keep electronic copies of all work submitted. In case your file submission is too big, please break it into several smaller files, and then submit these smaller files in several submissions.
- Professional courtesy and a positive, collaborative attitude are required in all aspects of this course. I invite open, honest communication. However, all communication must be on a professional level, not personal.
- You are expected to produce quality work in this course. Spelling, grammatical errors, structure and presentation will influence your final grade and each grade on any project.
- Please, DON'T WAIT UNTIL THE LAST MINUTE to complete and submit your assignments! There might be some technical glitches in the system: try to avoid them. The best way to avoid them is to start your assignments as soon as they are posted.
- You are welcome to use any resources to successfully complete your assignments. Outside resources should be quoted and a proper reference to the resource should be made.
- Typically the communication in this class is carried via BlackBoard Email, however E-mail messages could be also sent to your UTEP email address, so, please, check your UTEP e-mail every day.

Attendance. Due to the nature of the course and amount of material to be covered, attendance in this class is mandatory, and will greatly influence your overall grade performance in the course. Please, inform the instructor of your impending absence in advance. Class attendance plays an important role in expressing your commitment and professionalism and it is a critical factor in your successful completion of the course. You will be dropped from the class if you miss more than two class meetings. Additionally, if for some reason you are unable to complete all the requirements of the course, it is the student responsibility to drop from the course before the datelines set forth by the university for the semester.

Course Instructional Methods

The instructional methods pertinent to the efficient delivery of the material will focus on the following didactical processes and procedures:

1. Introduction and Exposition of new material via BlackBoard email and Discussion Board
2. Instructor-led illustration of selected chapter material.
3. Student-led presentations of Lesson Plans, Reflections, analysis of math related children and student misconceptions, etc (work presented individually and/or collaborate in groups).
4. Student-led mathematics teaching and assessment/reflection during October/November Math Camp activities.
5. Instructor-led summary and discussion of presented chapter material or evaluation of material taught.

Course Evaluation

- Specific assignments will be posted in the Discussion Forums on BlackBoard.
- The assignments will be different for undergraduate students from ELED 4310 class and graduate students in MTED 5322 class.
- Graduate students should follow APA style in writing reports. An example of APA proposal follows at this site <http://dianahacker.com/pdfs/Hacker-Mira-APA.pdf>

Tentative Course Schedule/Calendar and Description of the Assignments

Dates	Assignments
Week 1 (F2F) <i>Aug 31</i>	Introduction. Works on technology enhanced activities (number and operations concepts). Assignment 1 is sent by Blackboard email .
Week 2 (F2F) <i>Sep 6</i>	Discussion on Pedagogical Content Knowledge. Assignments can be found in Discussion Forums on Blackboard .
Week 3 (F2F) <i>Sep 13</i>	Students' presentations. Assignments can be found in Discussion Forum on Blackboard .
Week 4 (F2F) <i>September 20</i>	Assignments can be found in Discussion Forum on Blackboard .
Week 5 <i>September 27 (F2F)</i>	Assignments are posted in Discussion Forum "Week 5" (on Blackboard) .
Week 6 <i>Oct 4 (F2F)</i>	Assignments are posted in Discussion Forum "Week 6" (on Blackboard) . Math Camp presentations (group and individual work).

Week 7 <i>Oct 11 (F2F)</i>	Assignments are posted in Discussion Forum “Week 7” (on Blackboard) . Math Camp presentations (group and individual work).
Week 8 <i>October 18 (F2F)</i>	Assignments are posted in Discussion Forum “Week 8” (on Blackboard) . Math Camp presentations (group and individual work).
Week 9 <i>Nov 1 (F2F)</i>	Assignments are posted in Discussion Forum “Week 9” (on Blackboard) . Math Camp presentations (group and individual work).
Week 10 <i>Nov 8 (F2F)</i>	Assignments are posted in Discussion Forum “Week 10” (on Blackboard) . Math Camp presentations (group and individual work).
Week 11 <i>Nov 15 (F2F)</i>	Assignments are posted in Discussion Forum “Week 11” (on Blackboard) . Math Camp presentations (group and individual work).
Week 12 <i>Nov. 22 (ONLINE)</i>	Assignments are posted in Discussion Forum “Week 12” (on Blackboard) . Math Camp reflections (group and individual work).
Week 13 <i>Nov. 29 (ONLINE)</i>	Assignments are posted in Discussion Forum “Week 13” (on Blackboard) .
Week 14 <i>Dec. 6 (F2F)</i>	Final presentations.
Week 15 <i>Dec. 13 (F2F)</i>	Final presentations.

Course Grading

Grade Distribution (ELED 4310)

Active Participation/Positive Attitude, No CAMP (8 weeks x 2 pts)	16 pts
Active Participation/Positive Attitude, CAMP (7 weeks x 5 pts)	35 pts
Reflections/Presentations/Quizzes	49 pts
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	100 pts

Grade Distribution (MTED 5322)

Active Participation/Positive Attitude, No CAMP (8 weeks x 2 pts)	16 pts
Active Participation/Positive Attitude, CAMP (7 weeks x 5 pts)	35 pts
Reflections/Scholarly Papers/Quizzes	49 pts
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	100 pts

Students with Disabilities

If you have or believe you have a disability, you may wish to identify yourself. You can do this by contacting the Center for Accommodations and Support Services Office to show documentation of a disability or to register for testing and services. Students who have been designated as disabled must reactivate their standing with this office yearly.

Please, visit the following website for more details: <http://sa.utep.edu/cass/>

You are encouraged to demonstrate *knowledge of content/ issues discussed in the class, critical thinking, and communication accuracy* while completing major course assignments.

The course instructor reserves the right to adjust the course syllabus or change assignments as needed. Remember that our course syllabus and class schedule are living documents and can change!

Copyright Notice

Many of the materials that are posted within this course are protected by copyright law. These materials are only for the use of students enrolled in this course and only for the purpose of this course. They may not be further retained or disseminated.

*The course instructor reserves the right to adjust the course syllabus or change assignments as needed. Remember that our course syllabus and class schedule are living documents and can change.

Rubrics

Rubric for Lesson Plan

Items present in the Lesson Plan	Item and explanation are absent from LP Points = 0	Everything related to this item is partially explained, and articulated (1-3 points)	Everything related to this item is well explained, and articulated (4-5 points)	Total Points earned
<u>Title, time, grade level</u>				
<u>National and State Standards</u>				
<u>Connection to textbook ideas (connection is explained, page numbers are provided)</u>				
<u>Materials/resources/references used (in your Final Project, please, provide <i>extensive</i> references for your lesson)</u>				
<u>Lesson Introduction/Opening Activities</u>				
<u>Explanation of the type of mathematical knowledge that will be taught in this lesson (procedural or conceptual or both)</u>				
<u>Detailed description of mathematical activities</u>				
<u>Description of questions you might anticipate from different students (beginning learner, intermediate learner, advanced learner); description of your answers</u>				
<u>Will you be using any manipulatives? Why yes or why no? How will you be using them?</u>				
<u>Closing the lesson: will you be doing assessment (to find out if students acquired mathematical knowledge you were teaching)? will you summarize and provide conclusions and future directions?</u>				

Grading Rubric for Short Reflection

Category Exceeds Standards

Meets Standards

Does not Meet Standards

<i>Short Reflection</i>	The piece is thoughtful, engaging, and clearly written. The piece shows careful consideration of the topic at hand. It responds directly to the question or prompts and makes meaningful connections with the readings and course content. The piece has been proofread.	Shows adequate reflection along with some level of thoughtfulness, and may or may not have responded directly to the question or prompt. It also contain grammatical or sentence structure errors that disrupt the flow of the narrative.	Does not adequately address the question or prompt, and shows limited thoughtfulness.
Points	(5)	(4-3)	(2-1)

Grading Rubric for Online Discussion

Points	5	3-4	1-2
Analysis / Interpretation	The message uses sources, including outside as well as required reading. In addition, it demonstrates that the student has gained new understanding of the topic.	Some messages do analysis or interpretation well, but a significant number do not. This might be because the analysis was not done well or because it was not attempted (that is, was simply opinion).	Messages generally show little evidence of analysis, consisting instead of opinion and feelings and impressions.
Writing Skill	Sentences are clear and wording is unambiguous. Correct word choice, correct spelling, and correct grammar. Writing style can still be conversational rather than formal. The writing does not have to be flawless, but it will be better than average writing.	Ordinary, good writing. Lapses are regular and patterned, but do not undermine the communication or the persuasiveness of the argument.	Grammar, spelling, and/or word choice errors are frequent enough that the sense of the message is lost or muddled.
Participation	Messages contribute to ongoing conversations, as replies to questions or comments, or as new questions or comments. Messages that originate a thread usually generate responses. Student does not start a topic or pose a question and then abandon it.	Some messages contribute to ongoing conversations, but others are disconnected. If the student starts a new thread, sometimes there is follow-up but sometimes there isn't. Student tries to further the class discussion but is not successful a significant number of times. Or, student posts a significant (though still a minority) number of messages that are off-the-cuff and do not contribute substantively.	Messages are unconnected with what others are saying, as if there is no conversation. No replies to other messages. Student never answers someone else's question. When student asks a question, there's no acknowledgment to any responses.

Participation Rubric

Throughout the semester students are expected to:

- Participate fully in class activities and assignments. Understand your roles and responsibilities in acquiring Student Learning Outcomes for this class.
- Make insightful comments, informed by required reading and your own critical thinking. Demonstrate reflections on your readings. Communicate questions, comments and thoughts on readings.
- Treat class activities, group discussions as important components of the course, showing respect for fellow classmates and the course material.

Participation points will be assigned based on the extent to which students meet the above criteria.

Description of performance	Points earned
Student exceptionally and consistently demonstrates the	4

critterion throughout the semester	
Student proficiently and frequently demonstrates the criterion throughout the semester	3
Student satisfactory and intermittently demonstrates the criterion throughout the semester	2
Student inadequately and sporadically demonstrates the criterion throughout the semester	1
Student does not demonstrates the criterion throughout the semester	0

Scholarly Paper Rubric

Criterion	Strong (11-9 pts)	Acceptable Pass(8-5 pts)	Not Acceptable (4-1 pts)
Foundation of Knowledge	<p>Response demonstrates a professional command of the subject matter.</p> <p>The scholarly conversation about the topic is analyzed and synthesized; response shows how ideas are related.</p>	<p>Response demonstrates above average command of subject matter.</p> <p>Analysis, synthesis, or relationships among ideas are explored.</p>	<p>Response explains some concepts, but overlooks critical details.</p> <p>Analysis, synthesis, or relationships among ideas are not provided.</p>
Organization and development of Ideas and/or arguments	<p>Major sections of response follow a logical sequence.</p> <p>Organization within sections is logical and consistent.</p> <p>If section headings are used, they are clear and logically placed.</p> <p>Fully responds to each component of the questions.</p>	<p>Major sections of response generally follow a logical sequence.</p> <p>Organization within sections is basically logical.</p> <p>Minimal responses to all components of the question.</p>	<p>The structure of the response is unclear or relies on simplistic narrative.</p> <p>Organization between paragraphs is difficult to determine.</p> <p>If section headings are used, they are vague and/or, illogical.</p> <p>Response does not address all the components of the question.</p>
Writing Skills	<p>Response demonstrates an excellent command of grammar, spelling, and mechanics and is free of distracting errors.</p> <p>Word use is appropriate and accurate.</p>	<p>Response demonstrates a good command of grammar, spelling, and mechanics and has only a few distracting errors.</p> <p>Word use is generally appropriate and accurate. May have a few misused words.</p>	<p>Response has consistent patterns of error in grammar, spelling, and mechanics that must be addressed.</p> <p>There are frequent, noticeable errors or inappropriate uses of words.</p>

Citations	In-text citations clearly and appropriately identify every author whose ideas are referred to, discussed, summarized, paraphrased, or quoted.	In-text citations identify most authors whose ideas are referred to, discussed, summarized, paraphrased, or quoted. One or two citations are vague or inaccurate.	In-text citations are generally inconsistent, unclear, misplaced, or missing.
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