Course Description

EDEL 520: Elementary Mathematics Education Component. This initial licensure course enables prospective teachers to study practices, content, and issues related to mathematics in the elementary school classroom, including contemporary instructional strategies through model lessons and demonstrations, selected content, planning, resources, and evaluation. Furthermore, it requires an implementation during student teaching. Students learn to integrate mathematics with other disciplines, particularly social studies, science, and literacy, to frame math learning and teaching in contexts with which children can identify. Prospective teachers will apply Colorado Academic Standards for Mathematics in lessons they prepare and teach in keeping with the Performance Based Standards for Colorado Teachers.

Program Knowledge Base

The knowledge base of this course is centered on the collectively held belief that teachers engage in reflective thought and practice, which leads to the processes of rational problem solving and decision-making. The program adheres to the belief that teachers construct knowledge about learners, about content and processes, and about contexts that surround teaching and learning through reflection, reading, writing, discussion, and field-based experiences. The Elementary Education Department recognizes integration both within and across specific curricular areas in the elementary school. The knowledge base for this course is therefore consistent with the program of Elementary Education.

This mathematics education course focuses on increasing the prospective teacher’s level of pedagogical content knowledge. Classroom teachers make choices for optimizing pupils’ learning based on their professional knowledge of appropriate mathematics content, instructional strategies, and learners themselves. The course instructor uses modeling, direct instruction, demonstrations, and coaching, to provide experiences that promote problem solving, social participation in current instructional strategies, and professional reflection. Examples of mathematics integration with other areas give experience of mathematics in context in conjunction with appropriate mathematics content courses, prepares prospective teachers to implement instruction consistent with National Council for Accreditation of Teacher Education Program Standards for Elementary Teacher Preparation, Performance Based Standards for Colorado Teachers, Colorado Academic Standards for Mathematics, standards promulgated by the National Council of Teachers of Mathematics and other professional organizations.

Sources providing a knowledge/research base for this component of EDEL 520 Course include such professional organizations and learned societies and their publications as the following: National Council of Teachers of Mathematics, School Science and Mathematics Association, University of Chicago School Mathematics Project, National Council for the Social Studies, International Reading

**Goals of the Course**

EDEL 520 prepares prospective teachers to develop an instructional knowledge base in the mathematics curriculum commonly taught to elementary school students in Colorado. This knowledge is used to integrate thinking skills, academic content, and democratic dispositions in ways that make learning mathematics a relevant and meaningful experience for all children. By making instruction comprehensible, increasing interaction among students, and teaching thinking and study skills, candidates will learn how to develop activities and plan lessons that meet the needs of all students at different states of development.

- Prospective teachers will acquire competence in guiding the mathematical education of elementary school children in exploring mathematical concepts, per se, and through integrating mathematics with other areas.
- Prospective teachers will cultivate a systematic application of reflective decision making in promoting the mathematical education of elementary school students.
- Prospective teachers will value and act upon their understanding that mathematics is a dynamic discipline, important to every student's future, one in which all young people can participate as creative and successful learners and one which opens societal opportunities regardless of race, gender, religion, handicap, or national origin.

**National and State of Colorado Standards Met**

PBSCT – Performance-Based Standards for Colorado Teachers
NCATE – National Council for Accreditation of Teacher Education
NCTM – National Council of Teachers of Mathematics

<table>
<thead>
<tr>
<th>Course: EDEL 520 - Effective Instruction in Elementary School Mathematics</th>
<th>Standards</th>
<th>All course objectives are assessed on activities, lessons, papers, and final exam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Objective</td>
<td>PBSCT/UNC</td>
<td>InTaSC</td>
</tr>
<tr>
<td>Prospective teachers will acquire competence in guiding the mathematical education of elementary school children in exploring mathematical concepts, per se, and through integrating mathematics with other areas.</td>
<td>4, 5, 8</td>
<td>1.0, 2.3, 3.1</td>
</tr>
</tbody>
</table>

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Prospective teachers will cultivate a systematic application of reflective decision making in promoting the mathematical education of elementary school students.

<table>
<thead>
<tr>
<th>Prospective teachers will value and act upon their understanding that mathematics is a dynamic discipline, important to every student's future, one in which all young people can participate as creative and successful learners and one which opens societal opportunities regardless of race, gender, religion, handicap, or national origin.</th>
<th>2.1-2.2; 3.1-3.8; 4.4; 5.1, 5.3, 5.5, 6.1, 7.1</th>
<th>7, 8, 9</th>
<th>1.0, 2.3, 3.5</th>
<th>Things to ponder, discussions, and mathematical journey folder assignment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-dimensional geometric figures: The Pythagorean Theorem (1)</td>
<td>2</td>
<td>5</td>
<td>3.2, 3.4</td>
<td>Burn’s textbook, equity principle, ethnomathematics activity, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will become familiar with mathematics learning and instruction in the elementary school grades and across mathematical strands.</td>
<td>5.02.1 (a) ~ (e)</td>
<td>4, 5, 8</td>
<td>Number and operation, Algebra, Geometry, Measurement, Data analysis &amp; Probability</td>
<td>1.0, 2.3</td>
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<tr>
<td>5.02.2</td>
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<tr>
<td>5.04.2</td>
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<td>5.04.1/5.04.2</td>
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<tr>
<td>5.04.3/5.04.4</td>
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<tr>
<td>Prospective teachers will select developmentally appropriate practice, consistent with Piagetian and constructivist theories, for elementary school mathematics teaching and learning.</td>
<td>5.06.01 8.02.3(b)</td>
<td>1, 7, 8</td>
<td>Communication</td>
<td>1.0, 2.3, 3.1, 3.5</td>
</tr>
<tr>
<td>5.04.1/5.04.2</td>
<td></td>
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<tr>
<td>5.04.3/5.04.4</td>
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<tr>
<td>Prospective teachers will become familiar with selected resources, including children's literature, for elementary school mathematics experiences and encounters.</td>
<td>2, 5</td>
<td></td>
<td>2.3</td>
<td>Modeling, children’s literature brought to class, and math concept lesson plan assignment.</td>
</tr>
<tr>
<td>5.06.01 8.02.3(b)</td>
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<tr>
<td>Prospective teachers will understand the central role of problem solving in learning and applying mathematics.</td>
<td>4</td>
<td>Problem solving</td>
<td>2.3, 3.3</td>
<td>Van de Walle textbook, activities, discussions, and modeling.</td>
</tr>
<tr>
<td>5.04.1/5.04.2</td>
<td></td>
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<tr>
<td>5.04.3/5.04.4</td>
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<tr>
<td>Prospective teachers will understand the concept of “drill and practice at the problem solving</td>
<td>4</td>
<td>Problem solving</td>
<td>2.3, 3.3</td>
<td>Van de Walle textbook, activities, discussions, and modeling.</td>
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<tr>
<td>Level”</td>
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<tr>
<td>Prospective teachers will understand “mathematics is a search for relationships that are not obvious”.</td>
<td>4</td>
<td>Reason &amp; proof</td>
<td>2.3, 3.3</td>
<td>Van de Walle textbook, Usborne textbook, activities, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will analyze and skillfully apply a learning cycle approach to mathematics planning, instruction, and reflection.</td>
<td>5.03.4</td>
<td>2, 7, 8, 9</td>
<td>1.0, 2.3, 3.1, 4.0, 5.1</td>
<td>Math concept lesson plan assignment.</td>
</tr>
<tr>
<td>Prospective teachers will take equity and diversity into consideration when planning and implementing elementary school mathematics learning experiences.</td>
<td>5.06.1/5.06.2</td>
<td>1, 2, 7, 8</td>
<td>1.0, 3.1, 3.2, 3.4</td>
<td>Equity principle, videos, modeling, lecture, Malloy textbook, culturally responsive mathematics, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will augment or extend textbooks for elementary school mathematics learning and teaching.</td>
<td>5.03.4</td>
<td>4, 7</td>
<td>2.3</td>
<td>Math curriculum activity, Van de Walle textbook, technology classroom centers article, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will organize and implement mathematics learning experiences for peers and for elementary school students.</td>
<td>5.05.2/5.05.3</td>
<td>4, 5, 6, 7, 8</td>
<td>1.0, 2.3, 3.1, 3.5</td>
<td>Math concept lesson plan assignment, modeling, and videos.</td>
</tr>
<tr>
<td>Prospective teachers will develop awareness of roles for technology, including calculators and computers, in teaching and learning elementary school mathematics.</td>
<td>5.07.1/5.07.2</td>
<td>3, 10</td>
<td>2.3</td>
<td>Cyberhunt activity, Van de Walle textbook, technology classroom centers article, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will encounter integration of elementary school mathematics with other areas and with people's lives, so as to craft math lessons in contexts that are meaningful to all children and cultures.</td>
<td>5.06.2/5.06.3</td>
<td>2, 5</td>
<td>1.0, 2.3, 3.4, 3.5</td>
<td>Videos, Burns' textbook, Van de Walle textbook, modeling, and discussion.</td>
</tr>
<tr>
<td>Prospective teachers will assess as an ongoing informal and formal process to inform, and to improve math learning experiences and student performance.</td>
<td>5.03.3</td>
<td>6, 7</td>
<td>1.0, 2.3, 4.0, 5.1</td>
<td>Ashlock activity, assessment principle, and math concept lesson plan assignment.</td>
</tr>
</tbody>
</table>
Required Text

4. Plus one of the following texts:

Recommended Texts


Selected Children’s Books Used in Class


**Selected Web Sites Used in Class**

- Colorado Department of Education at http://www.cde.state.co.us
- National Council of Teachers of Mathematics (NCTM) at http://www.nctm.org
- NCTM Illuminations at http://illuminations.nctm.org

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Grades Earned

93-100 percent is an “A”
80-92 percent is a “B”
70-79 percent is a “C”
60-69 percent is a “D”
Below 59 percent is an “F”

A (93-100% of points): A final grade of A means that the student has performed all or most in-class assignments and projects at an advanced level and/or exceptional level and has done so in a timely manner. He/she is always well prepared for class with notes about reading topics, contributes to discussions on a regular basis during whole class discussion and in small groups, and has missed no more than 1 class.

B (82-92% of points): A final grade of B means that the student has shown “good graduate level work” in his or her performance by being prepared to complete in-class assignments and discussions. He/she also has turned in required projects and assignments on time and met most of the grading criteria. He/she has not missed more than 2 classes.

C (71-81% of points): A final grade of C means that the student has completed all or most course assignments and projects but has not always met criteria. A grade of C is assignment when a student (a) completes required projects and is sometimes prepared for class but often does not participate in class discussions; (b) turns in projects that are inadequate based on documented grading criteria; and/or (c) is absent from class more than twice.

F (less than 59% of points): A final grade of F means that the student has not satisfactorily completed the course assignments, completed required readings, or participated in class discussions. A grade of F is assigned when the student loses a significant amount of points (a) through excessive absenteeism, (b) by not coming to class prepared or (c) by not completing assigned projects.

Policy on Incompletes: An “I” is assigned due to unanticipated circumstances during the last week of the term that make the student unable to complete course requirements within the allotted time (e.g., he/she missed the final examination due to sickness or an emergency in the family). The instructor must submit to the school director a written notice of the specific coursework to be completed before the final grade is determined; a copy is kept in the school and one is provided to the student. To amend the grade of “I” with an earned grade on the student’s transcript, the student must complete all incomplete course work by the last day of the next semester. If the course requirements are not completed within the time limitation and the grade received in the Registrar’s Office, the grade will be recorded on the academic record as a failing or unsatisfactory grade.

Policy on Plagiarism: Plagiarism is the act of appropriating the written, artistic, or musical composition of another, or portions thereof; or the ideas, language, or symbols of same and passing them off as the product of one’s own mind. Plagiarism includes not only the exact duplication of another’s work but also the lifting of a substantial or essential portion thereof (UNC definition). Regarding written work in particular, direct quotations, statements which are a result of paraphrasing or summarizing the work of another, and other information which is not considered common knowledge must be cited or acknowledged, usually in the form of a footnote. Quotation marks or proper form of indentation shall be used to indicate all direct quotes. Regarding class projects, you are not to use as your entire presentation the completed works of faculty members, fully incorporated websites, or any other body of work in which

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you are not the author. Of course, with proper referencing, you can import portions of such works and websites to enhance and illustrate your presentation, and you can provide references to these other works for students who have an interest in pursuing a topic further.

**Policy on Originality of Products:** You are encouraged to build on your own previous work from other classes and programs, and to integrate material and ideas that you have learned in other classes into this class, with appropriate referencing. But projects from other classes are not to be duplicated and turned in to fulfill EDEL 520 requirements, nor can you take work that you completed in another class and simply re-configure it, or enhance it, for this class. In other words, you are expected to do original work for each project and assignment that you complete in this class.

**Accommodation Statement:** Students who believe that they may need accommodations in this class are encouraged to contact the Disability Support Services, Voice/TTY (970) 351-2289, or fax (970) 351-4166, or visit [www.unco.edu/dss](http://www.unco.edu/dss) as soon as possible to ensure that accommodations are implemented in a timely fashion.

**Inclusivity Statement**
The College of Education and Behavioral Sciences (CEBS) supports an inclusive learning environment where diversity and individual differences are understood, respected, appreciated, and recognized as a source of strength. We expect that students, faculty, administrators and staff within CEBS will respect differences and demonstrate diligence in understanding how other peoples' perspectives, behaviors, and worldviews may be different from their own.
Course Assignments

1. Present a Mathematics Concept Lesson Plan around a mathematics theme in a group of three by choosing a lesson from your third required textbook that uses a children’s book to teach at least one concept (content standard) for 30 minutes. Each group will present the lesson to the whole class by creating an age appropriate lesson plan, teaching this math concept accurately to the whole class, and discuss how this lesson would meet the needs of all learners in your classroom. Everyone must have a turn reading from the children’s book, and discuss how this lesson would meet the needs of all learners in your classroom. You need to bring one copy of your lesson plan for Dr. Harding-DeKam to have while you are presenting, and you need to post your lesson on Blackboard for your peers. The evaluation rubric is at the end of this syllabus (24 points) Due July 6, 8, 15, 20, 22, & 27.

2. Compose a Math Facing an American Phobia Reflection Paper based on the reading of the book by Burns. You need to reflect upon at least three ideas you agree with, disagree with, and/or would like to extend. This should be a two to three page double spaced paper with font size 12 expressing your opinion about this affective side of mathematics. The evaluation rubric is at the end of this syllabus. (12 points) Due July 13.

3. Develop a Mathematical Journey reflection on practice on your perspectives about math. You will engage in a project you can adapt so that children can relate to mathematics present in their lives. This project encourages the creative use of various kinds of learning and modalities. The following elements are required: (1) visual representations of your own mathematical journey throughout your life, which will serve as a map of your journey, (2) artifacts you collect as evidence of your mathematical journey during our course, and (3) one page reflection of your changing perspectives on learning in mathematics through this course. (26 points) Due July 22.

4. Complete an Internet Cyber Hunt with integrated mathematics themes. This is an online assignment in Blackboard. Detailed instructions will be presented. (15 points) Due July 8.

5. Complete a Take Home Final including all reading materials and all issues covered in class. This is an essay Final with seven questions and you choose the four you would like to answer out of the seven. Each question will be worth 15 points. (60 points) Due July 27 at beginning of class. No late finals will be accepted.

6. Develop a Mini Unit around a central theme with a social studies topic or science topic of your choice integrated with mathematics applications. This Mini Unit lesson will be presented in small groups for twenty minutes. You need to bring one copy of your lesson plan for Dr. Harding-DeKam to have while you are presenting, and you need to post your lesson on Blackboard for your peers. Detailed Instructions and assessment criteria for developing, implementing, and evaluating the Mini Unit will be distributed and explained. The evaluation rubric is at end of syllabus (50 points) Due July 29.

7. Participation in Class Activities. We will have readings, activities, and discussions taking place in our class. Activities will be completed individually, in small groups, and as a whole class. This requirement promotes democratic dispositions and models their presence in the classroom. (25 points) Due Everyday
Class Overview and Reading Assignments

All chapters need to be read out of *Elementary and Middle School Mathematics Teaching Developmentally (Eighth Edition)* by Van De Walle, Karp, & Bay-Williams unless otherwise noted. NCTM = National Council of Teachers of Mathematics Standards CAS = Colorado Academic Standards for Mathematics

June 29, 2015 Monday
Responsive Classroom
Overview of Course
How do students learn math?

July 1, 2015 Wednesday
NCTM: Algebra Standard, Equity Principle, & WIDA Math Standard
CAS: Standard 2-Patterns & Algebra
Algebra Through Problem Solving
Teaching Diversity & Ethnomathematics

Due Today: Read chapters 6 & 14;
Math Dictionary p. 6-15 & 68-70

July 7, 2015 Tuesday
Virtual Class! No Class in person!
NCTM: Technology Principle
Blackboard Technology Assignment
Technology in the Elementary Classroom

Due Today: Read chapter 7 & 10
Math Dictionary p. 62-66
Complete Cyber Hunt

July 13, 2015 Monday
Mathematics as a Phobia?
Teaching to the affective side of mathematics
Holding all students accountable in Math
Understanding dispositions


July 20, 2015 Monday
NCTM: Numbers & Operations Standard
CAS: Standard 1-Number Sense/Properties/Operation
Understanding Fractions/Decimals/Ratios/Percent

Due Today: Read chapters 15 & 16
Math Dictionary p. 16-30

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July 27, 2015 Monday
NCTM: Data Analysis & Probability Standard
CAS: Standard 3-Data Analysis/Stats/Probability
Understanding & Representing Data
Investigating Probability
**Due Today:** Read chapters 21 & 22
   Math Dictionary p. 117-127
   Final Exam

July 29, 2015 Wednesday
How should math be taught in the elementary classroom?
Integration of math, social studies, & science
Putting the course together!
**Due Today:** Mini Unit Presentations

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## Mathematics Lesson Plan Rubric

<table>
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<tr>
<th></th>
<th>High Quality 6 Points</th>
<th>Quality 4 Points</th>
<th>Low Quality 1 point</th>
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</thead>
<tbody>
<tr>
<td><strong>Lesson Plan Content</strong></td>
<td>Covers mathematics concept in depth by acquiring, analyzing, organizing and processing information. Elaborate throughout. Includes details. Teaches concept accurately.</td>
<td>Includes essential information. Includes elaboration beyond minimal requirements. Concept is clear.</td>
<td>Lacking essential information. Lacks elaboration. Concept is unclear.</td>
</tr>
<tr>
<td><strong>Teaching</strong></td>
<td>Concept is clearly presented. Directions are concise. Method &amp; grouping decisions enhance learning for all students. Manipulatives are used to enhance lesson.</td>
<td>Concept is presented. Method &amp; grouping decisions make sense. Directions are clear. Active constructivist learning takes place.</td>
<td>Lacks clarity of concept. Directions are unclear. Methods &amp; grouping do not make sense.</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>Colorado Academic Standards for mathematics/language arts, learning objectives, assessments were used precisely.</td>
<td>Some Colorado Academic Standards were used appropriately with student learning objectives.</td>
<td>Colorado Academic Standards for mathematics and language arts were not used appropriately.</td>
</tr>
</tbody>
</table>

### Mini Unit Rubric

- **Container:** Decorated, practical, includes all required items. ____ / 4
- **Presentation:** Reading of Book and Presentation of lesson elements. ____ / 6
- **Active Lesson:** Includes active participation and genuine learning experiences. ____ / 20
- **Math and Social Studies Connection:** Math and Social Studies/Science are integrated within this lesson in an appropriate manner. ____ / 10
- **Overall:** Value of the integrated lesson: Does the lesson combine literature, Math, and social studies/science in an active learning experience for all students? ____ / 10

Total: ____ / 50

Meaningful Comments:

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<table>
<thead>
<tr>
<th></th>
<th>High Quality 4 Points</th>
<th>Quality 3 Points</th>
<th>Low Quality 1 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper Content</strong></td>
<td>Covers mathematics concepts in depth by acquiring, analyzing, organizing, and processing your reflection.</td>
<td>Covers mathematics concepts with essential reflection information.</td>
<td>Lacks mathematics concepts essential information. Lacks a clear reflection.</td>
</tr>
<tr>
<td><strong>Paper References</strong></td>
<td>Three ideas from the book are elaborated on in the paper to support your reflection. A page number is referenced after the sentence where it’s found in the book. Example (p. 53).</td>
<td>Two ideas from the book are elaborated on in the paper to support your reflection. A page number is referenced after the sentence where it’s found in the book. Example (p. 53).</td>
<td>One idea from the book is elaborated on in the paper to support your reflection. No page numbers are referenced.</td>
</tr>
<tr>
<td><strong>Writing of Paper</strong></td>
<td>Whole paper gives evidence to professional level writing with correct grammar and spelling. Structure of assignment is followed.</td>
<td>Evidence of some professional level writing with correct grammar and spelling. Structure of assignment is followed.</td>
<td>Lacking evidence of professional level writing. There is no structure for assignment.</td>
</tr>
</tbody>
</table>