

# Math 611

## Counting and Whole Number Operations: K -8 Learning and Teacher Practices



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and by appointment

### Course

**Description:** This course is a deep exploration into the teaching and learning of counting, whole numbers, and whole number operations. Investigation of the learning trajectory of number and operations throughout the K-8 curriculum, and instruction and activities based on effective standards for mathematical practice will be emphasized. Attention will also be given to deepening the candidates understanding of the mathematics and specialized content knowledge related to the teaching of number and operations as outlined in the *Common Core State Standards* for grades K - 8.

**Required Materials:** Course materials and lists of recommended texts and readings are available on the Math 611 Moodle page.

**Course Structure:** This is an online course, so all elements of this course will be conducted from the Moodle page. Instruction will be conducted through a mix of direct instruction, activities, readings, discussions and reflections, and analysis of elementary school student work.

**Course Objectives:** Students will be expected to meet the counting, whole numbers, and whole number operations content knowledge and specialized mathematics knowledge competencies required by TSPC in their document *Knowledge, Skills and Abilities for Elementary Mathematics Instructional Leader Specialization* and as specified by the publication: *Standards for Elementary Math Specialists: A Reference for Teacher Credentialing and Degree Programs*; a publication of the Association of Mathematics Teacher Educators.

Course outcomes are listed in the table on the last page.

**Coursework:** This course will consist of introductory materials and activities, followed by four learning modules, each of which is a unit consisting of mathematics instruction and student activities. In the first portion of each learning module, students will be expected to demonstrate a basic level of mathematics proficiency on a competency quiz. The course will conclude with summary materials relating the four modules to the course TSPC standards and related common core standards.

## Course Assessment:

Proficient or better on all competency quizzes	Required*
Introductory assignments	7%
Modules 1-4 (20% each)	80%
Course Summary Paper	13%
Total	100%

\*-10% of course grade for every quiz not passed at proficiency level or better by the end of finals week

**Letter Grades.** A letter grade will be given based on the following scale (connected to the class rubrics, which use a 5-point scale. Moodle has weighted percents, so your final grade will be based on the Moodle percent x 5 and the following scale. For example, if you have an 85% in Moodle,  $.85 \times 5 = 4.25$ . So based on the scale below, you would receive an A-.

<b>A</b>	[4.5,5]	<b>A-</b>	[4,4.5)	<b>B+</b>	[3.5,4)	<b>B</b>	[3,3.5)	<b>B-</b>	[2.5,3)
<b>C+</b>	[2,2.5)	<b>C</b>	[1.5,2)	<b>C-</b>	[1,1.5)	<b>D</b>	[.5,1)	<b>F</b>	[0,.5)

**Late Policy** See your Course Guide.

**Student Support Services:** Disability Accommodation: If you have a documented learning disability, please talk to me during the first few days of class, I will be more than happy to accommodate you in any way that I can. If you have a documented disability which requires any academic accommodations, you must go to the Office of Disability Services (ODS) for appropriate coordination of your accommodations. You can drop by APSC 405 or contact ODS at (503) 838-8250 to schedule an appointment.

**Veterans and Active Military Personnel** with special circumstances are welcome and encouraged to communicate these, in advance if possible, to the instructor.

**Incomplete Policy:** An Incomplete can only be granted for a student who is passing a class and has a documented emergency that prevents them from completing the course.

COURSE OUTCOME	OREGON TSPC STANDARDS	AMTE-EMS STANDARD	ASSESSMENT
<p><b>Content Knowledge for Teaching: Candidates will deeply understand:</b></p> <p><b>NUMBER AND OPERATIONS</b></p> <ul style="list-style-type: none"> <li>• Pre-number concepts: Non-quantified comparisons (less than, more than, the same), containment (e.g., 5 contains 3), 1-to-1 correspondence, cardinality, meaningful counting, and ordinality.</li> <li>• A comprehensive repertoire of interpretations, representations, and properties of the four operations of arithmetic (whole numbers) and of the common ways they can be applied.</li> <li>• Place value: The structure of place-value notation in general and base-10 notation in particular; how place-value notations efficiently represent even very large numbers, as well as decimals; use of these notations to order numbers, estimate, and represent order of magnitude (e.g., using scientific notation).</li> <li>• Multi-digit calculations, including standard algorithms, mental math, and non-standard ways commonly created by students; informal reasoning used in calculations.</li> </ul> <p><b>ALGEBRA AND FUNCTIONS</b></p> <ul style="list-style-type: none"> <li>• Axioms: Recognize commutativity, associativity, and distributivity, and 0 and 1 as identity elements in the basic number systems; understand how these may be used in computations and to deduce the correctness of algorithms. Understand the relationship between addition and subtraction and between multiplication and division. The need for order-of-operations conventions.</li> </ul>	<p>Knowledge, Skills and Abilities for Elementary Mathematics Instructional Leader Specialization 3a, 4</p>	<p>Ia Deep understanding of mathematics for grades K–8</p>	<p>Homework</p> <p>Projects (including EMIL portfolio entries)</p> <p>Quizzes and Exams</p>
<p><b>Specialized Mathematics Knowledge for Teaching: Candidates will learn to</b></p> <ul style="list-style-type: none"> <li>• Support the development of mathematical proficiency as characterized by conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (National Research Council, 2001).</li> <li>• Create opportunities for learners to develop mathematical practices and to critically evaluate their selection and use of these practices.</li> <li>• Diagnose mathematical misconceptions and errors and design appropriate interventions.</li> <li>• Decide whether, how and how far, to utilize specific oral or written responses from learners.</li> <li>• Recognize, evaluate, and respond to multiple, often non-standard solutions to problems.</li> <li>• Choose and/or design tasks to support the learning of new mathematical ideas or methods, or to test learners’ understanding of them.</li> </ul>	<p>Knowledge, Skills and Abilities for Elementary Mathematics Instructional Leader Specialization 3a, 4</p>	<p>Ib Further specialized mathematics knowledge for teaching.</p>	<p>Homework</p> <p>Projects (including EMIL portfolio entries)</p> <p>Quizzes and Exams</p>