

Math 181.02

# Fundamentals of Mathematics I: Numbers & Operations

Fall 2008

CRN: 10784

Meets TR 8:00-9:15a.m. in Ross 2060

3 Credits



<b>Instructor</b>	Joe Champion
<b>E-Mail</b>	joseph.champion@unco.edu (preferred contact method)
<b>Website</b>	www.unco.edu/nhs/mathsci/facstaff/champion/personal/
<b>Office Hours</b>	Ross 2246, Mon & Wed 2:00-3:00pm; Tues & Thurs 1:00-2:00pm; Ross 1250, Mon 9:00-9:50am; Also by appointment.
<b>Required Text</b>	Beckmann, S. (2008). <i>Mathematics for elementary teachers</i> (2 <sup>nd</sup> ed.). Boston, MA: Pearson.
<b>Required Materials</b> (bring to every class)	<ul style="list-style-type: none"> <li>• A calculator</li> <li>• Colored pencils or colored markers</li> </ul>
<b>Prerequisite(s)</b>	None.

## Catalog Description



First of three courses designed for prospective elementary teachers. Emphasizes the real number system and arithmetic operations. Explorations focus on mathematical structures and subsets of real numbers, via patterns, relationships, and properties. Content presented using problem solving and exploration.

## Course Goals and Content

As part of the General Education Program, successful completion of both MATH 181 and 182 satisfies the Category 2 Mathematics Skills Area requirement. The ultimate goal of this course sequence is to increase content knowledge, broaden teaching practices, and foster confidence in teachers of elementary mathematics. MATH 181 course content involves:

- Use of mathematics to structure understanding of and investigate questions in the world around us.
- Treatment of mathematical content at an appropriate level.
- Use of numerical, graphical, and algebraic representations.
- Interpretation of data, analysis of graphical information, and communication of process and solutions in written and oral form.
- Use of mathematics to formulate and solve problems.
- Use of technology such as calculators and computers to support the use of mathematics.

## Course Objectives

Upon completing this course, students will be able to:

- Recognize the meaning and use of place value in efficiently representing whole numbers and finite decimals, comparing and ordering numbers, and understanding the relative magnitude of numbers; understanding that the value of each place is ten times larger than the value of the next place to the right.
- Demonstrate knowledge of the historical development of number and number systems including contributions from diverse cultures.
- Develop the meaning of addition, subtraction, multiplication, and division and provide multiple models for whole number operations and their applications.
- Demonstrate proficiency in and understanding of multi-digit computation using standard and alternative/invented algorithms, mental mathematics, and computational estimation.
- Analyze integers and rational numbers, their relative size, and how operations with whole numbers extend to integers and rational numbers.
- Recognize commutativity, associativity, distributivity, identities, and inverses as properties of operations on a given domain and appreciate that a small set of rules governs all of arithmetic.
- Understand the multiplicative structure of the whole numbers including the Fundamental Theorem of Arithmetic and the relationship between factors, multiples, and prime factorizations.

Note: The course goals and objectives align with Standards 1 and 6 of the Colorado Model Content Standards for Mathematics, the Number and Operations Standard of the National Council of Teachers of Mathematics, and the Number and Operations recommendations for elementary teacher preparation by the Conference Board of the Mathematical Sciences.

## Math 181 Syllabus (continued)

### Course Questions

In this class, we will investigate and address the following questions:

- What is a number?
- Why do we need different types of numbers?
- What can we do with numbers besides using them to count things?
- Why do we need the four arithmetic operations of addition, subtraction, multiplication, and division?
- What generalizations can be made in operating on numbers?
- Why are prime numbers so important?



### Outline of Course Content

- Basic Set Theory
  - Venn diagrams
  - Sets, subsets, intersection, and union
- Whole Numbers
  - Place value of the base-ten number system
    - Numeration systems
  - Arithmetic Operations
    - Order of operations
    - Standard and alternative algorithms
    - Number properties of the whole numbers
    - Inverse operations
  - Structure of the Whole Numbers – Number Theory
    - Fundamental Theorem of Arithmetic
    - Prime Number Test
    - Divisibility
    - Factors and multiples
    - Greatest Common Divisor and Least Common Multiple
- Integers
  - Comparing and ordering integers
  - Arithmetic operations
    - Standard and alternative algorithms
    - Number properties of the integers
- Rational Numbers
  - Definition of ratio and rational numbers
  - Fractions
    - Types of fractions
    - Mixed and improper fractions
    - Comparing and ordering fractions
    - Arithmetic operations
    - Standard and alternative algorithms
  - Decimals
    - Terminology and notation
    - Comparing and ordering decimals
    - Arithmetic operations
    - Standard and alternative algorithms
  - Connections between fractions and decimals
    - Negative exponents
    - Terminating and repeating decimals
    - Density of rational numbers
    - Number properties of the rational numbers
  - Percents
    - Proportions
    - Calculations with percents
- Real Numbers
  - Irrationals
    - Definition of irrational
    - Common examples (e.g.,  $\pi$ ,  $\sqrt{5}$ )
  - Number properties of the real numbers



### Grading

Grades in this class will be a weighted average of your scores in the following categories (descriptions follow):

- 5% Participation, Attendance and Professionalism,
- 25% Homework, Quizzes, and Other Class Assignments
- 35% Two Projects (Project 1 – 15%, Project 2 – 20%)
- 35% Three Tests (Test 1 – 10%, Test 2 – 15%, Final Test [comprehensive]– 10%)

You'll earn a whole or "plus" letter grade (i.e., no minus grades) based on your weighted final average and the following scheme:

A: 90-100%    B+: 87-89%    B: 80-86%    C+: 77-79%    C: 70-76%    D: 60-69%    F: 0-59%

## Math 181 Syllabus (continued)

### Participation, Attendance, and Professionalism

A high degree of professionalism, participation, and attendance in class is expected. Remember that you are responsible for your learning and conduct.

#### Code of Conduct:

- Be on time for class (2 absences are allowed) and attend the entire class period.
- Turn-in assignments on-time.
- Come prepared and with a positive and energetic attitude.
- Limit side activities or interruptions.
- Avoid negativism and rudeness.
- Respect and treat each other, and encourage all to participate.
- Focus on learning- both yours and your peers'.



Participation, Attendance, and Professionalism will be assessed as follows:

0-39%	40-54%	55-69%	70-84%	85-99%	100%
The student fails to follow the code of conduct and/or <i>has 7 or more class absences.</i>	The student mostly fails to follow the code of conduct and/or <i>has no more than 6 class absences.</i>	The student generally follows the code of conduct and/or <i>has no more than 5 class absences.</i>	The student mostly follows the code of conduct and/or <i>has no more than 4 class absences.</i>	The student follows the code of conduct and <i>has no more than 3 class absences.</i>	The student follows the code of conduct and <i>has no more than 2 class absences.</i>

### Homework, Quizzes, and Other Class Assignments

Homework will be used as a chance for you to practice and refine your understanding of the material covered in class. Quizzes will be used to assess your understanding of the content covered in the class – a little bit like a mini-test. *Quizzes will often be take-home.* As a class, we will establish expectations for homework and quizzes including (1) when assignments will be given, (2) when they will be due, (3) the procedures for completing assignments, (4) how late assignments will be handled, and (5) how assignments will be graded. After our class discussion on these issues, I will hand out an addendum to the syllabus outlining these expectations.

Homework and quizzes are your study material for tests, so justify every result with some explanation, even if you used a calculator or mental math. Explain yourself using words or drawings. Ask yourself: Will I be able to understand my work when reviewing for the test? Keep all assignments until the end of the semester.

### Projects

You will be required to complete 2 projects by selecting a project from 2 of the 3 units in the table below. At least one of your projects must be completed in a small group consisting of 2-4 members. Refer to the table below for deadlines associated with each unit. More information about these projects is forthcoming.

Possible Units for Projects (Choose 2)	Select a Project by...	Submit your Project by...
1. Meaning of Numbers	September 16	October 21
2. Operations with Whole Numbers and Integers	September 30	November 18
3. Operations with Rational Numbers	November 6	December 4

### Tests

Test dates are tentatively scheduled for **September 30, November 6, and December 4**. The final meeting time is scheduled for **Friday, December 12 from 8:00-10:30am**, according to the final exam schedule. While we may have the final exam prior, we will meet during this time and **attendance is required**. Note these dates and prepare your schedule (e.g., work schedule, flight reservations) in accordance; *NO exceptions will be made*.

Evaluation of the examinations is based on point values of each test item, with partial credit awarded as appropriate. For most of the exam, open notes/textbook are NOT allowed; however, for five minutes approximately half way through the testing period, you will be allowed to refer to your notes and/or homework (not your textbook).

## Math 181 Syllabus (continued)

**Course Website (Blackboard)** <http://bb.unco.edu/>

The online home of the course on Blackboard contains class announcements, handouts, in-class activities, course documents, and all your scores in the class. I recommend that you visit the site often to check announcements and check on your progress in the course.

### Important Dates

- Last day to add or drop class: *Monday, September 8*
- Last day to withdraw from the class and receive a 'W': *Friday, October 17*



### Help

I encourage you to come see me for help early and often this semester, especially if you've struggled with math classes in the past. For tutoring help, here are some options:

- The **Math Lab**, located in Ross 1250, provides *free drop-in tutoring services*. Available tutor hours are posted on the door and at <http://hopper.unco.edu/mathed/tutoring/>
- The university has a **Tutoring Center** in the Michener Library. Appointments are necessary for each *free* one hour appointment. To schedule an appointment, go to Michener L149.
- The **Math Department** in Ross 2239 maintains a list of private tutors that provide fee-based math tutoring.

### Academic Dishonesty

Behavior that appears to be cheating will not be tolerated and will be addressed according to University policy as outlined in the Student Handbook ([www.unco.edu/dos/handbook/links.htm](http://www.unco.edu/dos/handbook/links.htm)). Possible disciplinary actions range from earning no credit on an assignment to a failing grade in the class along with a notation on your permanent transcript stating that you failed due to academic dishonesty.

### Disability Support Services

Students who believe that they may need accommodations in this class are encouraged to contact the Disability Support Services (970) 351-2289 as soon as possible to ensure that accommodations are implemented in a timely fashion.

### UNC Honor Code

All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: *Honesty, Trust, Respect, Fairness, and Responsibility*. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

### Changes

The instructor reserves the right to amend, adjust, or otherwise modify the syllabus at any time during the course with notice.

## Tentative Course Schedule for Math 181

Week	Class	Date	Event	Unit/Content		
1	1	8/26	Introductions			
2	2	8/28		<b>Meaning of Numbers:</b> Sections 2.1 – 2.4, 3.1 – 3.4		
	3	9/2				
3	4	9/4				
	5	9/9				
4	6	9/11				
	7	9/16				
5	8	9/18				<b>Meaning of Operations w/ Whole Numbers &amp; Integers:</b> Sections 4.1, 4.2, 4.6, 5.1 – 5.7, 6.3, 7.1, 7.2
	9	9/23				
6	10	9/25				
	11	9/30	<b>Test 1</b>			
7	12	10/2				
	13	10/7				
8	14	10/9				
	15	10/14				
9	16	10/16		<b>Number Theory:</b> Sections 12.1 – 12.3	<b>Meaning of Operations with Rational Numbers:</b> Sections 4.3, 6.1, 6.2, 7.3 – 7.5	
	17	10/21				
10	18	10/23				
	19	10/28				
11	20	10/30				
	21	11/4				
12	22	11/6	<b>Test 2</b>			
	23	11/11				
13	24	11/13				
	25	11/18				
14	26	11/20				
	27	11/25				
15	28	11/27	<b>No Class</b>			
	29	12/2				
	30	12/4	<b>Final Test</b>	Conclusion		
Finals Week	31	12/12	<b>Final Meeting</b>	Final Meeting Time: Friday from 8:00-10:30a.m.		