

## **MATH 155: Integrated Mathematics I**

**Objective:** The purpose of this syllabus is to guide the participant in the requirements, demands, logistics and expectations of this course.

### **Getting Help:**

To receive technical assistance on issues related to WebCT contact:

Academic Instructional Technology Help Desk

ES 102

Monday-Thursday 8:00 a.m. - 9:00 p.m. Friday 8:00 a.m. - 5:00 p.m.

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**Instructor:** Dr. Smith

**E-mail:** Use the Mail tab in this course

**Address:** 3578 East Hartsel Drive #124

Colorado Springs, CO 80920

### **Welcome from your instructor**

Welcome to MATH 155: Integrated Mathematics I.

This is the first of a 2-course sequence for Teacher Certification. This course covers subjects such as critical thinking, set theory, number systems, percents, ratios, and proportions. This course is not a methods course, but it does touch on this subject. Intermediate algebra is a prerequisite for this course, so you should be comfortable with these topics prior to taking this course.

In this class, you will need graph paper, lined paper, a calculator, and an open mind. All graphs must be done on graph paper. If you need this file as a Word document, please e-mail me and I will send it as an attachment. Mathematics can be great fun, so don't be apprehensive, regardless of your past experiences with it. I happen to love math and I love to teach, so I will help you to succeed in this class.

You will find contact information for me on the syllabus. Whenever you have any questions, please let me know and I will help you work through them.

Please send your assignments to me as you complete them through the Assignments tab or the Assessments tab.

I look forward to working with you.

Sincerely,  
Dr. Smith

## **Course Description:**

This is the first of a 2-course sequence presenting arithmetic and algebra from a modern perspective. Students work to understand and be able to articulate connections among mathematical structures, including natural numbers, integers, rational numbers, relations, functions, and equations.

**Credit hours:** Three semester hours

**Course Prerequisites:** MATH 099: Intermediate Algebra

## **Required Textbook**

To order textbooks or obtain information about book titles you may go to [www.exstudies.adams.edu](http://www.exstudies.adams.edu) and click on the “ASC Bookstore” icon.

Use **Section Number: 1060** to order books from Bookstore site.

Billstein, Rick; Libeskind, Shlomo; Lott, Johnny W. *A Problem Solving Approach to Mathematics for Elementary School Teachers*, 9th Edition. Boston: Pearson Education/Addison Wesley, 2007. ISBN 0-321-33179-6.

## **Optional Textbook**

Levy, Louis L. *Student’s Solutions Manual*, 9th Edition. Boston: Pearson Education/Addison Wesley, 2007. ISBN 0-321-33126-5.

This book contains detailed, worked-out solutions to all odd-numbered section exercises and all Chapter review exercises.

**This solutions manual is highly recommended by your instructor.**

## **Student Learning Outcomes:**

The student will:

1. Utilize the key mathematical processes of communicating, reasoning, solving problems, and making connections.
2. Demonstrate an understanding of structure, properties, and operations in the real number system.
3. Utilize mental computation and estimation techniques.
4. Demonstrate an understanding of basic number theory concepts and processes.
5. Solve problems using ratios, proportions.

## **Course Requirements:**

There are seven homework lessons. The first six each require assigned exercises to be submitted to the instructor. The seventh is the development of a lesson plan. There are three tests (each with a 2-hour time limit) and one final test (2-hour time limit).

## **Course Instructions:**

### **Written Homework Assignments**

All lesson assignments are to be submitted to the instructor. This is to be done through the Assignment tab in the left-hand navigation bar. Every problem must be attempted on all assignments. I will grade the even problems and verify that the odd ones are completed. You must show all work on homework for full credit. This means you are to show the steps you took to solve the problems. View each problem as an example you would present to your own math students. Looking at your problem should provide sufficient information for them to follow the steps to arrive at the solution you did. The examples in the text are one example of this. The solutions manual also provides examples of what is expected here. Note that all graphs must be done on graph paper.

For the “questions from the classroom,” a typed, well-written paragraph is required for each. This means a minimum of three sentences for each question. This will be combined with the problem sets to make up the homework portion of your grade.

### **CAPS Assignments**

CAPS means Collected and Assessed Problems. There is one CAPS Assignment for each of the first five lessons. Each CAPS Assignment is worth 20 points. These assignments are the preliminary problem found on the title page of each chapter. Note that there is a hint before the “Questions from the Classroom.” The write-up for these should include a paragraph of introduction, a paragraph detailing the strategy, diagrams, figures, and/or formulas as necessary to explain the solution, and the steps taken to arrive at the solution. This will be graded based on the thoroughness of the explanation and the correctness of the solution.

### **Examinations**

All exams must be proctored and are timed. All exam questions are similar to homework questions. You will not have multiple choice or true/false questions. Partial credit can be earned if you show your work. You will have two hours to complete each exam. You may use one (1) 8/5x11 sheet of paper with notes for each exam as well as a calculator, which does not calculate payments, interest, etc. Please refer to the Guidelines for Proctored Exams and submit your Exam Request Form three weeks BEFORE you plan to take the exam. [Guideline for Proctored Exams.pdf](#) and [Request Exam.pdf](#) will be used to assist you in completing the proctored exam.

### **Course Time Limits'**

You have one year from your date of registration to complete this course. If you are receiving federal or private financial aid, requirements may differ. However, the minimum requirement for course completion, regardless of the number of credit hours, is six weeks. **No student may complete course requirements in less than six weeks.**

It is important to schedule your course study to fit into your academic plan. If you have important deadlines to meet such as graduation, be sure to complete and submit all of your assignments and take the final examination at least five weeks before the credit is needed. It is your responsibility to ensure the credits for this course will apply toward graduation or certification deadlines.

## **Course Schedule**

### **Module 1 – Problem Solving**

#### **Goals and Objectives**

In this module, the student will learn about problem solving techniques specifically related to Mathematics. The problem solving techniques of Polya, involving a 4-step process, will be introduced and utilized.

#### **Objectives:**

1. Understand and apply the Polya 4-step approach to problem solving.
2. Identify and mathematically describe patterns.
3. Write an equation and apply properties of equations to systems of equations.
4. Utilize logic and reasoning as problem solving skills to evaluate statements, conditionals, and bi-conditionals.

#### **Reading**

Read Chapter 1.

#### **Assignment**

1. Preliminary problem for Chapter 1.
2. Complete the following problem sets:
  - 1.1 – 1, 2, 3, 4, 9, 10, 13, 14, 16, 19
  - 1.2 – 1, 2, 3, 6, 12, 13, 14, 15
  - 1.3 – 1, 2, 5, 9, 10, 13
  - 1.4 – 1, 5, 6, 8, 11, 15Questions from the Classroom – choose any 2 questions  
Chapter Review: 1, 3, 7, 9, 13

### **Module 2 – Sets, Whole Numbers, and Functions**

## Goals and Objectives

In this module, the student will learn about sets, their operations and properties. Additionally, the student will learn about whole numbers and mathematical operations on them. Finally, functions will be covered.

### Objectives:

1. Define sets and subsets.
2. Apply set properties such as union, intersection, and Cartesian products.
3. Define a function.
4. Identify and manipulate sequential functions and composite functions.
5. Graph a function.

### Reading

Read Chapter 2.

### Assignment

1. Preliminary problem for Chapter 2
2. Complete the following problem sets:
  - 2.1 – 1, 2, 3, 6, 7, 11, 13, 17, 18
  - 2.2 – 1, 2, 3, 6, 7, 9, 11, 14, 25
  - 2.3 – 2, 3, 6, 9, 10, 15, 23
  - 2.4 – 1, 3, 5, 6, 11, 12, 20
  - 2.5 – 1, 4, 5, 8, 10, 12, 14, 21Questions from the Classroom – choose any 2 questions  
Chapter Review: 1, 3, 7, 12, 14, 23, 28

### Exam 1

Exam 1 covers modules 1 and 2. One (8½" x 11") page (one side) of notes may be used, as well as a calculator. This exam is two hours in duration.

## Module 3 – Numeration Systems and Whole-Number Computation

### Goals and Objectives

In this module, the student will learn various number systems, algorithms for whole number mathematical calculations, techniques for mental calculations, and estimation techniques.

### Objectives:

1. Understand and be able to convert numbers to and from a variety of numeration systems.
2. Apply algorithms for whole number addition, subtraction, multiplication, and division.
3. Understand and utilize mental mathematics for whole numbers.
4. Understand and utilize estimation techniques for whole numbers.

### **Reading**

Read Chapter 3.

### **Assignment**

1. Preliminary problem for Chapter 3
2. Complete the following problem sets:

3.1 – 2, 5, 6, 11, 14, 15, 28, 33

3.2 – 1, 5, 6, 11, 17

3.3 – 1, 4, 5, 12, 14, 15, 23

3.4 – 1, 2, 3, 6, 8, 10, 14, 17

Questions from the Classroom – choose any 2 questions

Chapter Review: 1, 2, 3, 16, 17, 20, 32

## **Module 4 – Integers and Number Theory**

### **Goals and Objectives**

In this module, the student will learn about integers and algorithms for integer mathematical calculations. This module also includes prime numbers, composite numbers, Greatest Common Divisor (GCD), Least Common Multiple (LCM), and modular arithmetic.

### **Objectives:**

1. Define integers.
2. Apply mathematical calculations on integers, including order of operations.
3. Define prime numbers and composite numbers.
4. Understand and utilize estimation techniques for integers.
5. Compute greatest common divisors and least common multiples.
6. Perform modular arithmetic in general and with clock and calendar applications.

### **Reading**

Read Chapter 4.

### **Assignment**

1. Preliminary problem for Chapter 4
2. Complete the following problem sets:

4.1 – 1, 3, 9, 12, 14, 25

4.2 – 5, 7, 8, 15, 20, 23, 41

4.3 – 1, 2, 4, 9, 18, 23

4.4 – 2, 3, 5, 6, 7, 10, 19, 27

4.5 – 1, 2, 3, 7, 15, 18, 21, 26, 31

4.6 – 1, 2, 7, 9, 10

Questions from the Classroom – choose any 2 questions

Chapter Review: 1, 17, 18, 22, 24, 25, 27, 35

## **Exam 2**

Exam 2 covers modules 3 and 4. One (8½" x 11") page (one side) of notes may be used, as well as a calculator. This exam is two hours in duration.

## **Module 5 – Rational Numbers, Fractions, and Proportions**

### **Goals and Objectives**

In this module, the student will learn about rational numbers, algorithms for rational number mathematical calculations, rational numbers used in fractions, and fraction mathematical calculations. This module also includes proportions.

### **Objectives:**

1. Define rational numbers.
2. Apply mathematical calculations on rational numbers.
3. Define fractions.
4. Apply mathematical calculations on fractions, including finding a common denominator for addition and subtraction.
5. Understand and utilize estimation techniques rational numbers and fractions.
6. Compute proportions and use proportions in calculations.

### **Reading**

Read Chapter 5.

### **Assignment**

1. Preliminary problem for Chapter 5
2. Complete the following problem sets:

5.1 – 1, 2, 10, 11, 13, 15, 17, 32

5.2 – 1, 2, 3, 5, 6, 9, 21, 27

5.3 – 1, 4, 5, 6, 9, 13, 17, 24

5.4 – 1, 2, 3, 5, 7, 11, 14

Questions from the Classroom – choose any 2 questions

Chapter Review: 1, 2, 3, 4, 5, 9, 15, 29

## **Module 6 – Decimals, Percents, and Real Numbers**

### **Goals and Objectives**

In this module, the student will learn about real numbers and decimals, algorithms for real numbers, and decimal mathematical calculations. This module also includes percents and interest computations.

### **Objectives:**

1. Define real numbers and decimals.
2. Apply mathematical calculations on real numbers and decimals.
3. Understand and utilize estimation techniques for real numbers and decimals.
4. Define scientific notation.
5. Convert any number to scientific notation.
6. Perform mathematical calculations on numbers in scientific notation format.
7. Define percents.
8. Compute percents and use percentages in calculations, including interest.

### **Reading**

Read Chapter 6.

### **Assignment**

1. Complete the following problem sets:

6.1 – 1, 2, 3, 6, 9, 10, 11, 15

6.2 – 1, 2, 5, 6, 7, 8, 14, 15, 18, 22

6.3 – 1, 2, 4, 10, 12

6.4 – 2, 3, 4, 7, 8, 14, 17, 23

6.5 – 1, 2, 3, 5, 7, 10, 12, 14, 19, 25

6.6 – 1, 2, 5, 7, 8, 11, 14, 19

Questions from the Classroom – choose any 2 questions

Chapter Review: 4, 5, 6, 7, 9, 11, 15, 18, 21, 23

### **Exam 3**

Exam 3 covers modules 5 and 6. One (8½" x 11") page (one side) of notes may be used, as well as a calculator. This exam is two hours in duration.

## **Module 7 – Module Planning**

### **Goals and Objectives**

To create a module for an elementary classroom based upon the material for this course.

### **Assignment**

Choose a topic and grade level based on the material covered in modules 1-6. Design a module plan to introduce the concepts, a group activity that reinforces the concepts, props, and/or other physical materials to demonstrate the concepts. Document the module plan in a paper at least five pages in length. The paper should use a standard module format such as those used in all public schools. The choice of format is yours, but the written portion of this assignment is to be at least three pages, double-spaced. This should include all visual aids and handouts. You must site your sources and have at least three sources. This module plan will be graded on the requirements listed above plus effectiveness, creativity, visual aids, format, and clarity.

### **Final Exam**

The Final Exam covers modules 1-6. One (8½” x 11”) page (one side) of notes may be used, as well as a calculator. This exam is two hours in duration.

### **GRADE DISTRIBUTION AND SCALE:**

In alignment with ASC academic policies, no D may apply to a major or minor field.

#### **Grade Distribution:**

Written Homework Assignments	150 points
Lesson Plan	100 points
CAPS Assignments	100 points
Exam 1 (Lessons 1, 2)	150 points
Exam 2 (Lessons 3, 4)	150 points
Exam 3 (Lessons 5, 6)	150 points
Final Exam (Lessons 1-6)	200 points
Total Points	1,000 points

#### **Scale:**

90-100%	A
80-89%	B
70-79%	C

60-69%

D

59% and below

F