

Burlington County College

MTH 113

Modern College Mathematics

Syllabus

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2009-2010

Division of Science, Mathematics, and Technology

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## **General Information**

**A. Division** : Science, Math, and Technology

**B. MTH 113** : Modern College Mathematics

**C. Credits** : Three ( 3 ) credits

**D. Prerequisites** : MTH 075 Elementary Algebra or one year of high-school algebra

### **E. Catalog Description**

This course is designed to satisfy the mathematics requirement for students in non-science fields. Course content includes units on sets, logic, numeration and mathematical systems, whole numbers, integers, rational numbers, irrational numbers and elements of number theory.

### **F. General Course Goals**

This course is designed to meet the following overall goals. More specific objectives are listed under each of the separate Unit descriptions.

1. To have the student understand and apply the principles of set theory.
2. To have the student understand and apply the principles of symbolic logic.
3. To have the student understand and apply the principles of numeration and mathematical systems.
4. To have the student understand and apply the principles of number theory.
5. To have the student recognize the characteristics and become skilled in analyses using real numbers.

### **G. Materials for Instruction**

REQUIRED Materials :

Textbook : Mathematical Ideas 11<sup>th</sup> Edition, by Miller, Herren, and Hornsby, 2008,  
Pearson Education, Inc.

## **H. Attendance Policy**

Attendance will be taken at all class meetings. See the Burlington County College Catalog for the details of the college's policy and your instructor for your class' policy.

## **I. Course Content**

### Set Theory

- Set Notation and Vocabulary
- Set Relations and Operations
- Venn Diagrams
- Cardinality of a Set

### Logic

- Statements and Logic Notation
- Truth Tables
- Logical Equivalence
- Conditional Statements
- Euler Diagrams
- Arguments

### Numeration and Mathematical Systems

- Expanded Notation and Exponents
- Base Conversions
- Modular Mathematical Systems
- Properties of Mathematical Systems
- Groups

### Number Theory

- Prime and Composite Numbers
- Greatest Common Factors
- Least Common Multiples

### Real Numbers

- Absolute Value
- Properties of Real Numbers
- Rational Numbers
- Irrational Numbers
- Decimals and Percents

## **J. Course Evaluation**

The course material is organized as listed below.

Unit 1 Set Theory

Unit 2 Logic

Unit 3 Numeration and Mathematical Systems

Unit 4 Number Theory

Unit 5 Real Numbers

The course grade is made up of any combination of Unit tests, quizzes, homework, individual projects, and/or group projects. See your instructor for your class' policy.

## **K. Student Contributions**

Students are expected to attend every class meeting.

Students are expected to be on time for every class meeting.

Beepers and cell phones are to be turned off for the duration of each class meeting.

Assignments are to be turned in on time.

Students are expected to take all tests as scheduled.

Each student will spend at least 2 hours per week preparing for class outside of class for every hour spent in class.

## Content Goals and Performance Objectives

### A. Set Theory

#### Content Goals

1. The student will identify well-defined sets.
2. The student will identify set notation symbols.
3. The student will interpret set notation symbols.
4. The student will contrast proper subsets and subsets.
5. The student will determine number of subsets.
6. The student will evaluate set operation expressions.
7. The student will contrast finite and infinite sets.
8. The student will determine set cardinality.
9. The student will illustrate Venn diagrams.
10. The student will solve Venn diagram word problems.

#### Performance Objectives

1. The student will not be allowed references. The student will demonstrate principle and concept understanding. Performance will be considered satisfactory if the principles and concept understanding is demonstrated in a manner consistent with the text. All content goals are related to this PO.
2. The student will not be allowed references. The student will solve application problems. Performance will be considered satisfactory if problems are solved in a manner consistent with the text. All content goals are related to this PO.

## **B. Logic**

### Content Goals

1. The student will identify statements.
2. The student will translate written statements to logic symbols and vice versa.
3. The student will identify logic symbols.
4. The student will interpret logic symbols.
5. The student will evaluate symbolic logic expressions.
6. The student will illustrate truth tables.
7. The student will contrast conditional statements.
8. The student will analyze arguments.
9. The student will identify standard argument forms.

### Performance Objectives

1. The student will not be allowed references. The student will demonstrate principle and concept understanding. Performance will be considered satisfactory if the principles and concept understanding is demonstrated in a manner consistent with the text. All content goals are related to this PO.
2. The student will not be allowed references. The student will solve application problems. Performance will be considered satisfactory if problems are solved in a manner consistent with the text. All content goals are related to this PO.

## C. Numeration and Mathematical Systems

### Content Goals

1. The student will interpret exponential expressions.
2. The student will convert between standard and expanded notation.
3. The student will evaluate arithmetic expressions in expanded form.
4. The student will convert between number bases.
5. The student will evaluate clock arithmetic expressions.
6. The student will evaluate modular arithmetic expressions.
7. The student will identify finite mathematical system properties.
8. The student will interpret finite mathematical system properties.
9. The student will evaluate expressions for a given finite mathematical system.
10. The student will identify groups.

### Performance Objectives

1. The student will not be allowed references. The student will demonstrate principle and concept understanding. Performance will be considered satisfactory if the principles and concept understanding is demonstrated in a manner consistent with the text. All content goals are related to this PO.
2. The student will not be allowed references. The student will solve application problems. Performance will be considered satisfactory if problems are solved in a manner consistent with the text. All content goals are related to this PO.

## **D. Number Theory**

### Content Goals

1. The student will identify prime numbers.
2. The student will identify composite numbers.
3. The student will contrast prime and composite numbers.
4. The student will use divisibility tests.
5. The student will write prime factorizations.
6. The student will determine greatest common factor.
7. The student will determine least common multiple.

### Performance Objectives

1. The student will not be allowed references. The student will demonstrate principle and concept understanding. Performance will be considered satisfactory if the principles and concept understanding is demonstrated in a manner consistent with the text. All content goals are related to this PO.
2. The student will not be allowed references. The student will solve application problems. Performance will be considered satisfactory if problems are solved in a manner consistent with the text. All content goals are related to this PO.

## **E. Real Numbers**

### Content Goals

1. The student will identify number types.
2. The student will contrast number types.
3. The student will evaluate absolute value expressions.
4. The student will identify real number operation properties.
5. The student will evaluate real number operations.
6. The student will apply order of operations.
7. The student will interpret real number operation properties.
8. The student will convert between rational and decimal numbers.
9. The student will evaluate rational number operations.
10. The student will simplify irrational number expressions.
11. The student will evaluate irrational number operations.
12. The student will convert between percents and decimal numbers.
13. The student will solve percent word problems.

### Performance Objectives

1. The student will not be allowed references. The student will demonstrate principle and concept understanding. Performance will be considered satisfactory if the principles and concept understanding is demonstrated in a manner consistent with the text. All content goals are related to this PO.
2. The student will not be allowed references. The student will solve application problems. Performance will be considered satisfactory if problems are solved in a manner consistent with the text. All content goals are related to this PO.

## Assignments

The assignments and timeline listed here are recommendations only. See your instructor for your classes' assignments and schedule.

The suggested schedules assume tests are given in the test center. See your instructor for your classes' testing policy and schedule.

### Suggested Schedule ( 14 Week Course )

#### A. Set Theory

Week	Content Goals	Assignment
1	1 through 7	(Optional) Read Chapter 1 Read Chapter 2 : Sections 2.1, 2.2, and 2.3 Section 2.1 : Page 56 1-8 all, 9-49 odd, 53-79 odd Section 2.2 : Page 63 1-6 all, 7-53 odd Section 2.3 : Page 75 : 1-6 all, 7-29 odd, 71, 81-87 odd, 95-101 odd
2	8, 9, and 10	Read Chapter 2 : Sections 2.4 and 2.5 Page 82 : 1-25 odd Page 92 : 1-6 all, 7-21 odd, 25-35 odd
3		Review Unit 1 and take Unit 1 Test

#### B. Logic

Week	Content Goals	Assignment
4	1 through 7	Read Chapter 3 : Sections 3.1, 3.2, and 3.3 Section 3.1 : Page 103 1-35 odd, 39-53 odd, 57-63 odd. Section 3.2 : Page 115 1-17 odd, 21-29 odd, 47-55 odd, 63-67 odd Section 3.3 : Page 124 1-17 odd, 21-31 odd, 55-63 odd
5	8 and 9	Read Chapter 3 : Sections 3.4, 3.5, and 3.6 Section 3.4 : Page 132 1-15 odd, 19-31 odd Section 3.5 : Page 137 1-11 odd, 17, 19 Section 3.6 : Page 151 1-23 odd, 27-35 odd
6		Review Unit 2 and take Unit 2 Test

### C. Numeration and Mathematical Systems

Week	Content Goals	Assignment
7	1, 2, 3 and 4	(Optional) Read Section 4.1 Read Chapter 4 : Sections 4.2 and 4.3 Section 4.2 : Page 177 1-25 odd Section 4.3 : Page 187 1-7 odd, 15-41 odd, 51, 53
8	5 through 9	Read Chapter 4 : Sections 4.4 and 4.5 Section 4.4 : Page 199 1-5 odd, 9, 19, 21, 29-39 odd Section 4.5 : Page 208 1-9 odd
9	10	Read Chapter 4 : Section 4.6 Section 4.6 : Page 216 3-17 odd Review Unit 3
10		Unit 3 Test

### D. Number Theory

Week	Content Goals	Assignment
10	1 through 7	Read Chapter 5 : Section 5.1 (Optional) Read Section 5.2 Read Chapter 5 : Section 5.3 Section 5.1 : Page 230 13-23 odd, 33-37 odd Section 5.3 : Page 247 11-27 odd, 31-41 odd, 65, 67, 69
11		(Optional) Read Section 5.4 Review Unit 4 and take Unit 4 Test

### E. Real Numbers

Week	Content Goals	Assignment
12	1 through 9	Read Chapter 6 : Sections 6.1, 6.2, and 6.3 Section 6.1 : Page 280 1-9 odd, 31-37 odd, 41-63 odd Section 6.2 : Page 292 7-41 odd, 45-59 odd Section 6.3 : Page 306 1-11 odd, 19-35 odd, 39-47 odd, 75-93 odd
13	10, 11, 12, and 13	Read Chapter 6 : Sections 6.4 and 6.5 Section 6.4 : Page 318 1-13 odd, 25-43 odd Section 6.5 : Page 331 11-19 odd, 33-53 odd, 73, 75, 77 Review Unit 5
14		Take Unit 5 Test and Review for Final Exam

## Suggested Schedule ( 10 Week Course )

### A. Set Theory

Week	Assignment
1	(Optional) Read Chapter 1 Read Chapter 2 : Sections 2.1 through 2.4 Section 2.1 : Page 56 1-8 all, 9-49 odd, 53-79 odd Section 2.2 : Page 63 1-6 all, 7-53 odd Section 2.3 : Page 75 1-6 all, 7-29 odd, 71, 81-87 odd, 95-101 odd Section 2.4 : Page 82 1-25 odd
2	Read Chapter 2 : Section 2.5 Section 2.5 : Page 92 1-6 all, 7-21 odd, 25-35 odd Review Unit 1 and Take Unit 1 Test

### B. Logic

Week	Assignment
3	Read Chapter 3 : Sections 3.1 through 3.4 Section 3.1 : Page 103 1-35 odd, 39-53 odd, 57-63 odd. Section 3.2 : Page 115 1-17 odd, 21-29 odd, 47-55 odd, 63-67 odd Section 3.3 : Page 124 1-17 odd, 21-31 odd, 55-63 odd Section 3.4 : Page 132 1-15 odd, 19-31 odd
4	Read Chapter 3 : Sections 3.5 and 3.6 Section 3.5 : Page 137 1-11 odd, 17, 19 Section 3.6 : Page 151 1-23 odd, 27-35 odd Review Unit 2 and Take Unit 2 Test

### C. Numeration and Mathematical Systems

Week	Assignment
5	(Optional) Read Section 4.1 Read Chapter 4 : Sections 4.2, 4.3, and 4.4 Section 4.2 : Page 177 1-25 odd Section 4.3 : Page 187 1-7 odd, 15-41 odd, 51, 53 Section 4.4 : Page 199 1-5 odd, 9, 19, 21, 29-39 odd
6	Read Chapter 4 : Sections 4.5 and 4.6 Section 4.5 : Page 208 : 1-9 odd Section 4.6 : Page 216 : 3-17 odd Review Unit 3 and Take Unit 3 Test

### D. Number Theory

Week	Assignment
7	Read Chapter 5 : Sections 5.1 and 5.3 Section 5.1 : Page 230 13-23 odd, 33-37 odd Section 5.3 : Page 247 11-27 odd, 31-41 odd, 65, 67, 69  (Optional) Read Sections 5.2 and 5.4 Review Unit 4 and Take Unit 4 Test

### E. Real Numbers

Week	Assignment
8	Read Chapter 6 : Sections 6.1, 6.2, and 6.3 Section 6.1 : Page 280 1-9 odd, 31-37 odd, 41-63 odd Section 6.2 : Page 292 7-41 odd, 45-59 odd Section 6.3 : Page 306 1-11 odd, 19-35 odd, 39-47 odd, 75-93 odd
9	Read Chapter 6 : Sections 6.4 and 6.5 Section 6.4 : Page 318 1-13 odd, 25-43 odd Section 6.5 : Page 331 11-19 odd, 33-53 odd, 73, 75, 77 Review Unit 5 and Take Unit 5 Test
10	Review for Final Exam Take Final Exam in class

## Suggested Schedule ( 5 Week Course )

### A. Set Theory

Week	Assignment
1	(Optional) Read Chapter 1 Read Chapter 2 : Sections 2.1 through 2.5 Section 2.1 : Page 56 1-8 all, 9-49 odd, 53-79 odd Section 2.2 : Page 63 1-6 all, 7-53 odd Section 2.3 : Page 75 1-6 all, 7-29 odd, 71, 81-87 odd, 95-101 odd Section 2.4 : Page 82 1-25 odd Section 2.5 : Page 92 1-6 all, 7-21 odd, 25-35 odd Review Unit 1
2	Take Unit 1 Test in Test Center

### B. Logic

Week	Assignment
2	Read Chapter 3 : Sections 3.1 through 3.6 Section 3.1 : Page 103 1-35 odd, 39-53 odd, 57-63 odd. Section 3.2 : Page 115 1-17 odd, 21-29 odd, 47-55 odd, 63-67 odd Section 3.3 : Page 124 1-17 odd, 21-31 odd, 55-63 odd Section 3.4 : Page 132 1-15 odd, 19-31 odd Section 3.5 : Page 137 1-11 odd, 17, 19 Section 3.6 : Page 151 1-23 odd, 27-35 odd Review Unit 2
3	Take Unit 2 Test in Test Center

### C. Numeration and Mathematical Systems

Week	Assignment
3	(Optional) Read Section 4.1 Read Chapter 4 : Sections 4.2 through 4.6 Section 4.2 : Page 177 1-25 odd Section 4.3 : Page 187 1-7 odd, 15-41 odd, 51, 53 Section 4.4 : Page 199 1-5 odd, 9, 19, 21, 29-39 odd Section 4.5 : Page 208 : 1-9 odd Section 4.6 : Page 216 : 3-17 odd Review Unit 3
4	Take Unit 3 Test in Test Center

### D. Number Theory

Week	Assignment
4	Read Chapter 5 : Sections 5.1 and 5.3 Section 5.1 : Page 230 13-23 odd, 33-37 odd Section 5.3 : Page 247 11-27 odd, 31-41 odd, 65, 67, 69 (Optional) Read Sections 5.2 and 5.4 Review Unit 4

### E. Real Numbers

Week	Assignment
4	Read Chapter 6 : Sections 6.1, 6.2, and 6.3 Section 6.1 : Page 280 1-9 odd, 31-37 odd, 41-63 odd Section 6.2 : Page 292 7-41 odd, 45-59 odd Section 6.3 : Page 306 1-11 odd, 19-35 odd, 39-47 odd, 75-93 odd
5	Take Unit 4 Test in Test Center Read Chapter 6 : Sections 6.4 and 6.5 Section 6.4 : Page 318 1-13 odd, 25-43 odd Section 6.5 : Page 331 11-19 odd, 33-53 odd, 73, 75, 77 Review for Final Exam Take Final Exam