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**Code:** MATH 136

**Title:** MATHEMATICS FOR THE LIBERAL ARTS

**Institute:** STEM

**Department:** MATHEMATICS

**Course Description:** This is a mathematics survey course that covers sets, logic, and two topics chosen from probability, numeration systems, geometry, consumer mathematics, and graph theory.

**Section Information:** All tests will be proctored in person.

**Prerequisites:** MATH 021 or MATH 025, or satisfactory completion of the college's foundational studies requirement in algebra.

**Credits:** 3

**Lecture Hours:** 3

**Lab:** 0

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**REQUIRED TEXTBOOK/MATERIALS:**

1. **Textbook:** MATH 136 – Math for the Liberal Arts Student Workbook, 1st Edition, by Brookdale Community College Mathematics Faculty. This custom textbook is sold only in the College Bookstore and is binder-ready with 3-hole punch.

**Note:** For textbook information in online and hybrid sections, see Instructor Addendum.

2. **Calculator:** You will need a scientific calculator for this course, such as the TI-30XS Multiview.

**ADDITIONAL TIME REQUIREMENTS:**

You will need to allow some on-campus time during each unit to meet with your group to work on the unit projects. Some discussions can be done via email or telephone.

**OTHER TIME COMMITMENTS:**

- In addition to the regular class hours, you will need to set aside time each week for homework. The weekly time will vary by topic and level of difficulty, but as an estimate, you should expect two homework hours for *each* class hour per week. For example, if your class meets for three hours per week, you should expect to spend about **six** hours per week on homework.
- If you are having any difficulty with the course material, you may need to allow time to see your instructor during office hours or to get help in the Math Lab.

**COURSE LEARNING OUTCOMES:**

Upon completion of this course, students will be able to:

- Demonstrate the mathematical skills appropriate to this course, based on the topics covered. (M)
- Analyze and solve application problems. (M)
- Explain how mathematical knowledge can be used in an applied situation and interpret solutions in the context of the situation. (M)
- Examine the diverse mathematical underpinnings of various real-world situations. (M)
- Use technology to solve problems. (M)

*Learning Outcome(s) support the following General Education Knowledge Areas:*

- (M) Mathematics

**COURSE OUTLINE:**

There will be four topics in this course:

1. Sets
2. Logic

The other two topics are chosen from the following:

3. Probability
4. Numeration Systems
5. Consumer Mathematics
6. Graph Theory
7. Geometry

At the beginning of the semester, your instructor will give you a written addendum specifying the particular topics included in the course.

**GRADING STANDARD:**

In this course, you will be evaluated by means of tests, activities/in-class work, quizzes (and possibly homework), and projects.

**A. TESTS**

There will be one test at the end of each unit. All supporting work must be shown on tests in order for your instructor to properly assess your understanding of the material. The tests will be given in class and it is expected that you will be in class to take the test on the day it is given. If you are very ill (verifiable with a doctor's note) or you have some other emergency, you *must* contact your instructor immediately.

**Note:** All tests will be proctored in person, see Instructor Addendum for more information.

**B. LABS/QUIZZES/HOMEWORK/OTHER ASSIGNMENTS**

There are in-class labs in this course. Labs may be done in groups. The labs contain problems that reinforce the concepts and skills learned in class. There are periodic quizzes in this course. Your instructor may also choose to use certain homework assignments, online homework, or other assignments for evaluation.

### C. PROJECTS

There is one project for each unit of the course, to be done in groups primarily outside of class. In the project, you will apply the concepts and skills learned in class to a problem situation, present the mathematics, write careful explanations, and interpret your results. Your group may be required to present your project to the class.

### GRADING

Your final course average is determined by a weighted average as follows:

<b>Average of four Unit Tests</b>	<b>65%</b>
<b>Labs, Quizzes, Projects, Homework, Other Assignments</b>	<b>35%</b>

### FINAL GRADE

Your final grade is determined as follows:

<b>If your final course average is</b>	<b>Your final grade is</b>
90 – 100	A
88 – 89	A-
86 – 87	B+
80 – 85	B
78 – 79	B-
76 – 77	C+
70 – 75	C
60 – 69	D**
Below 60	F

\*\* To use this course as a prerequisite for another mathematics course, you must have a grade of C or better.

### Incomplete

INC is only given at the discretion of your instructor. This may occur in documented cases of hardship or emergency. In this case, you must meet with the instructor to discuss the work that must be completed to earn a grade in the course. All work must be completed within 21 days after the end of the term, exclusive of official college closings.

### Withdrawal

You may withdraw from the course, without penalty, up to a date set by the College. If you do not withdraw from the course but stop attending, your grade at the end of the semester will be F.

**COURSE CONTENT: (TEXT SECTION)**

**Unit 1: Sets.** In this unit, you will study set notation, Venn diagrams and their applications, and the cardinality of sets.

**Unit 1 Outcomes:** You will:

- Define sets by using a word description and the roster method (2.1)
- Use set-builder notation to represent a set (2.1)
- Calculate the cardinal number of a set (2.1)
- Determine if given sets are equal and/or equivalent and explain the difference (2.1)
- Know the terms *well-defined set* and *empty set (null set)*, and interpret the practical applications of these terms (2.1)
- Know the term *universal set*, and find the *complement* of a set (2.2)
- Construct subsets and proper subsets of a given set (2.2)
- Use the correct formula to find the number of distinct subsets of a given set (2.2)
- Understand and be able to use the terms intersection and union to determine set membership (2.3)
- Understand De Morgan's laws for sets and interpret the relationship between sets in a practical context (2.3)
- Use Venn diagrams to visualize sets and their relationships and interpret the results in a practical context (2.3, 2.4)
- Calculate the cardinal number of a union of sets and interpret the result in a practical context (2.4)
- Analyze and solve application problems using Venn diagrams and interpret the results in the context of the application (2.4)
- In an applied situation, interpret set membership and explain this membership in everyday language (2.1, 2.2, 2.3, 2.4)
- Place two sets in a one-to-one correspondence to determine if they are equivalent (2.5)
- Identify whether a set is *infinite* and has cardinality of  $\aleph_0$  (2.5)
- Identify whether a set is *countable* (2.5)

**Unit 2: Logic.** In this unit, you will study logical statements and connectives, and construct truth tables to determine equivalency of logical statements or to determine under what conditions a given logical statement is true or false.

**Unit 2 Outcomes:** You will:

- Know the term *statement*, and determine whether or not a given sentence is a statement (3.1)
- Interpret logical symbols (3.1)
- Use connectives to create compound statements (3.1)
- Know conditions under which a connective is true or false and explain the reasons for the truth values of these connectives (3.1, 3.2, 3.3)
- Create truth tables using *and*, *or*, *not* and *if-then* and interpret these truth values in a practical context (3.1, 3.2, 3.3)
- Determine whether a logical statement is a tautology or self-contradiction, and explain how this concept applies to practical statements (3.2)
- Determine whether two statements are equivalent and explain how you know (3.2, 3.3)
- Understand and apply De Morgan's laws for logic; interpret these laws in a practical context (3.2)
- Writing equivalent forms and negation of the conditional (3.3, 3.4)
- Explain the converse, inverse, and contrapositive of a conditional statement (3.4)
- Determine whether an argument is valid or invalid and explain how you know (3.5)

***If your instructor chooses units other than the following two units, the instructor addendum will list the unit outcomes.***

**Chapter 12 Probability:** In this unit, you will study the basic rules of probability.

**Chapter 12 Outcomes:** You will:

- Apply the Counting Principle to determine the number of ways to perform a sequence of experiments in a specified order (12.1 )
- Construct a tree diagram to illustrate a sample space for an experiment and interpret the results (12.1)
- Find the number of permutations of  $n$  objects, taken  $r$  at a time and interpret the results in a practical context (12.2)
- Find the number of combinations of  $n$  objects, taken  $r$  at a time and interpret the results in a practical context (12.2)
- Apply both the empirical and theoretical approaches to probability to find the probability of an event (12.3)
- Given the probability of an event,  $A$ , determine the probability of its complement,  $not A$ , and explain the relationship between the two (12.4)
- Use the Addition Rule to find the probability that at least one of two events occurs, i.e.  $P(A \text{ or } B)$  (12.4)
- Identify and explain mutually exclusive events and use the Addition Rule with mutually exclusive events (12.4)
- Use Conditional Probability to find the probability of two successive events occurring. (12.5)
- Differentiate finding probabilities when you have independent versus dependent events. (12.5)
- Determine expectation in applications. (12.6)

**Chapter 6: Numeration.** In this unit, you will study ancient number systems and early computation methods, base systems and computation in other bases.

**Chapter 6 Outcomes:** You will:

- Know the types of number systems, including additive and positional (6.1, 6.2)
- Explain the workings of the Mayan, Babylonian, Roman, and Egyptian number systems (6.1, 6.2)
- Be able to translate between our number system and the above numbers systems (6.1, 6.2)
- Be able to add and subtract within the Egyptian system (6.1)
- Be able to add within the Babylonian number system (6.2)
- Explain advantages and disadvantages of various number systems (6.1, 6.2)
- Convert between base ten and other bases (6.3)
- Convert directly between computer bases (6.3)
- Explain the practical uses for other base systems (6.3)
- Be able to add, subtract, multiply and divide in other bases; explain “borrowing” and “carrying” in the context of other bases (6.4)

### **DEPARTMENT POLICIES:**

The Math Department wants you to be successful in this course. Because of this, we have compiled a list of strategies and behaviors.

#### **Attendance and class participation**

- If you want to be successful in this course, attend every class.
- Come to class on time, and stay for the entire class period. If you are late or leave during class, you will miss important class material and you will also distract your classmates and your instructor. (See the Student Conduct Code)
- Turn off your cell phone during class. You and your classmates need to be free from distractions. (See the Student Conduct Code)
- Bring your book and calculator to every class.
- Respect your classmates and your instructor. Listen carefully to questions asked and answers given. Treat all questions with respect.
- Participate fully in class. Volunteer answers, work problems, take careful notes, and engage in discussions about the material. Above all, stay on task.
- Contribute your share to your in-class lab work and do your best to make the group experience a positive one for all members.
- Do your own work on tests and quizzes. Cheating will not be tolerated. (See the Academic Integrity Code.)

#### **Homework**

- Homework is the way you practice the ideas and skills that are introduced in class. To be successful on the tests, you must do the homework. Homework may be collected and homework questions may be included on quizzes or tests.
- When you do the homework, write down all supporting work. Using the correct process is at least as important as getting the correct answer, so your work and steps are very important.
- Remember to check your answers. Answers will be in the back of the text or in the student's solutions manual.
- If there are questions you can't get or don't understand, ask about them at the beginning of the next class. If you have trouble with more than a few problems, try starting your homework in the Math Lab, where help is available.

#### **Absence**

- If you are sick and an absence is unavoidable, please call or email your instructor. You are still responsible for all material that was covered during your absence. You are expected to read the textbook and do the homework.
- Make time to see your instructor when you return so that you can get any papers you missed.
- Remember that you are expected to be in class for the tests and quizzes.

#### **Getting Help**

After you have tried the homework, there are ways to get help:

- Look in your text and your class notes for examples similar to the problems you are finding difficult.

- See your instructor during office hours or make an appointment. Bring the work you have done.
- Go to the **Math Lab** to get extra help on your homework or simply go and do your homework there. Someone will be there if you get stuck. You don't need an appointment to use the Math Lab.
- Form a **study group** with other class members. Working with other students can be a great way to learn. If you have a group to work with, consider meeting and working together in the Math Lab.
- Your textbook may have a complete solutions manual available in the Math Lab, which can be used in the Math Lab.
- You can use the computers in the computer lab within the Math Lab to do work related to your math course.
- In the Math Lab, you can get help on how to use your calculator.

Visit the [Math Lab website](#) to view hours and other useful information about the Math Lab.

### **COLLEGE POLICIES:**

As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit [www.brookdalecc.edu/support](http://www.brookdalecc.edu/support).

For information regarding:

- ◆ Brookdale's Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the [BCC STUDENT HANDBOOK](#) AND [BCC CATALOG](#).

### **NOTIFICATION FOR STUDENTS WITH DISABILITIES:**

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 (voice) or 732-842-4211 (TTY) to provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

### **MENTAL HEALTH:**

- Mental Health Crisis Support: From a campus phone, dial 5555 or 732-224-2329 from an external line; off-hours calls will be forwarded to BCC police (2222 from a campus phone)
- Psychological Counseling Services: 732-224-2986 (to schedule an appointment during regular hours)

*The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.*