

# Syllabus<sup>1</sup>

## INTRODUCTION TO MATHEMATICS

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**Length of Course:** One semester

**Prerequisite:** None.

**Text: none.** The notes are to be downloaded and printed from <http://faculty.kutztown.edu/mcloughl/Math017.asp>.

**Text (supplemental; unnecessary):**

The instructor may suggest supplemental reading from a number of sources; possibly including:

*The World of Mathematics*, Newman (Any edition). Simon and Schuster.

*Mathematical Ideas*, Miller & Heeren (Any edition). Harper-Collins.

*Schaum Outline Series: Basic Mathematics*, Kruglak, Moore, & Mata-Toledo (any edition). McGraw-Hill.

#### Objectives:

This General Education introductory-level course is intended to acquaint the student with the nature and spirit of mathematics. Topics include logic, set theory, counting methods, probability, statistics, and algebra-based problem solving with graphical and analytic solutions. This is a survey course in mathematics which is intended to satisfy the General Education mathematics requirement for most students at the university.

A student should have mastered and demonstrated the following skills after completing Math 017:

- the student is familiar with the nature and spirit of mathematical development;
- the student has increased his level of understanding of the concepts and processes of mathematics;
- the student demonstrates the ability to solve problems through applications of mathematical concepts and procedures;
- the student is able to engage in both intuitive and deductive reasoning in mathematical situations and realize the role of each in the development of mathematics;
- the student has realised to an appreciation of mathematics and the part it has played and will continue to play in shaping the world in which we live.
- the student is able to reason logically;
- the student is able to reason and recognise patterns and be able to make conjectures;
- the student is able to use mathematical symbols;
- the student understands the basic concepts of mathematics;
- the student is able to strike a judicious balance between theory and application, between computational skills and mathematical sophistication and between intuition and rigour;
- the student is able to read a proof of a statement;
- the student is able to construct a valid examples of true claims;
- the student is able to construct valid counterexamples to propositions which are false;
- the student is able to recognise and avoid common fallacies in arguments including begging the question, circular reasoning, affirming the conclusion, and denying the hypothesis.

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<sup>1</sup>This course is taught via a modified inquiry-based learning (IBL) method known as the Moore Method.

**Outline:**

A brief overview of some (but not all of) the course content:

**A. Logic**

1. Syllogistic logic
2. Symbolic logic
3. Statements
4. Connectives
5. Truth tables
6. Conditionals
7. Arguments
8. Tautologies, Fallacies, Contradictions
9. Euler Diagrammes
10. Problem Solving and Applications

**C. Consumer and Financial Math**

1. Introduction
2. Simple Interest
3. Compound Interest
4. Salary
5. Taxes
6. Amortisation
7. Finance Charges

**E. Statistics**

1. Introduction to Statistics
2. Measurement Scales
3. Measures of Central Tendency
4. Measures of Dispersion
5. Binomial Distribution
6. Normal Distribution
7. Problem Solving and Applications

**F. Mathematical Systems**

1. Axioms
2. Introduction to Algebra
3. Real Numbers
4. Base Arithmetic
5. Modular Arithmetic
6. Other Systems

**B. Sets and Counting**

1. Universe
2. Sets and operations
3. Venn diagrams
4. Counting Principles
5. Permutations and Combinations
6. Survey Problems
7. Other Problem Solving
8. Applications

**D. Probability**

1. Introduction to Probability
2. Rules of Probability
3. Conditional Probability
4. Independent Events
5. Combinatorics and Probability
6. Expected Value
7. Problem Solving and Applications

**F. Mathematical Systems**

1. Axioms
2. Introduction to Algebra
3. Real Numbers
4. Base Arithmetic
5. Modular Arithmetic
6. Other Systems

Section	Title	Chapters of the Notes	Pace (class dependent)
I	Preliminaries		1 day
II	Logic	Chapter 1	4 weeks
III	Sets	Chapter 2	$2\frac{1}{2}$ weeks
IV	Consumer Math	Chapter 1	3 weeks
V	Counting	Chapter 3	$2\frac{1}{2}$ weeks
VI	Mathematical Systems	Chapter 4	$2\frac{1}{2}$ weeks
VII	Probability	Chapter 5	$3\frac{1}{2}$ weeks
VIII	Statistics	Chapter 6	2 weeks
IX	Selected Areas of Application	if time	(to end)