



# BROWARD COLLEGE COURSE OUTLINE

**LAST REVIEW: 2009-10**

*(i.e. 2003-2004)*

**NEXT REVIEW: 2014-15**

*(i.e. 2008-2009)*

**STATUS: A**

*(A, I, D)*

**COURSE TITLE: History of Mathematics**

**COMMON COURSE NUMBER: MHF 4404**

**CREDIT HOURS: 3**

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS:**

*(Voc. Course ONLY)*

Lecture: **48**

Lab:

Clinic:

Other:

**PREREQUISITE(S):** MAC2311 and MAD 2104

**COREQUISITE(S):**

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION** *(750 characters, maximum):*

The main aim of this course is to introduce the student to the study of the history of mathematics. The study will include the development of mathematics through history, the impact of mathematics on society and how mathematics has broadened our knowledge of the world. Throughout the course students will be shown and encouraged to discover connections to mathematics as it is applied today. The course is designed to be of interest to persons of various backgrounds. This will include math students who want to understand the development of mathematics, teachers of mathematics at all levels and those students who have an interest in social and cultural history.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

## **UNIT TITLES**

1. Babylonian and Egyptian Mathematics
2. Greek Mathematics
3. Chinese, Indian, and Arabian Mathematics
4. Early European Mathematics
5. Analytic Geometry and the Beginnings of Calculus
6. Eighteenth and Early Nineteenth Century Mathematics
7. Later Nineteenth and Twentieth Century Mathematics
8. Mathematics around the world
9. Optional topics chosen by the instructor

**EVALUATION:**

Please provide a brief description (250 characters maximum) that details how students will be evaluated on the course outcomes.

Student Progress will be assessed by

Discussions ( in class and on-line)

Class Presentations

Research papers

Lesson plans and activities for specified topics

Integrating the use of technology into the study of historical topics.

Quizzes and exams

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

**GENERAL EDUCATION Competencies and Skills \*:**

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	NA
2. Speak and listen effectively	NA
3. Write clearly and coherently	NA
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	NA
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental )	NA
6. Apply problem solving techniques to real-world experiences	NA
7. Apply methods of scientific inquiry	NA
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	NA
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	NA
10. Collaborate with others to achieve common goals.	NA
11. Research, synthesize and produce original work	NA
12. Practice ethical behavior	NA
13. Demonstrate self-direction and self motivation	NA
14. Assume responsibility for and understand the impact of personal behaviors on self and society	NA
15. Contribute to the welfare of the community	NA

*\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*

## **UNITS**

### **Unit 1 Babylonian and Egyptian Mathematics**

#### **General Outcome:**

##### **1.0 The student shall:**

Demonstrate a basic understanding of the role of the Babylonians and Egyptians in the development of mathematics

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1** Explain Babylonian methods for solving quadratic equations.
- 1.2** Describe Babylonian methods for solving systems of the form  $x + y = a$  and  $xy = b$
- 1.3** Describe Egyptian mathematics as seen in the Rhind Papyrus
- 1.4** Summarize additional topics selected by the instructor

#### **FLORIDA COMPETENCIES AND SKILLS MET:**

##### **MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving
- 2.0 Knowledge of mathematical representations
- 4.3 Identify the relationship between mathematical concepts (e.g., repeated addition and multiplication).

**Common Course Number: : MHF 4404**

**Unit 2** Greek Mathematics

**General Outcome:**

**2.0 The student shall:**

Demonstrate a basic understanding of the role of the Greeks in the development of mathematics.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1** Describe Pythagorean mathematics, the proof and use of the Pythagorean theorem
- 2.2** Analyze the three famous problems of Greek times:
  - squaring a circle
  - duplicating a cube
  - trisecting an angle
- 2.3** Use compass and straight edge in constructions
- 2.4** Construct proofs as Euclid did in the elements
- 2.5** Perform problems found in basic Number Theory
- 2.6** Explain the role of prime numbers and the sieve of Eratosthenes
- 2.7** Apply the Chinese Remainder theorem

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations.
- 3.0 Knowledge of mathematics through reasoning.

4.6 Identify fundamental ideas that connect middle grades mathematics to advanced mathematics (e.g., trigonometry, number theory, precalculus, calculus).

8.1 Identify angles or pairs of angles as adjacent, complementary, supplementary, vertical, corresponding, alternate interior, alternate exterior, obtuse, acute or right.

8.2 Identify lines and planes as perpendicular, intersecting, skew, or parallel.

8.3 Identify triangles using the lengths of their sides or the measures of their angles.

- 8.4 Determine the sum of the measures of the interior angles and the sum of the measures of the exterior angles of convex polygons.
- 8.5 Determine the measures of the specified interior or exterior angles of a triangle or regular polygon.
- 8.6 Apply the inequality relationships among the angles and sides of a triangle.
- 8.7 Use the SAS, ASA, and SSS postulates to show pairs of triangles congruent, including the case of overlapping triangles.
- 8.8 Solve real-world problems involving similar or congruent figures.
- 8.9 Solve real-world problems applying the Pythagorean theorem and its converse.
- 8.10 Solve real-world problems by applying the 30o-60o-90o or 45o-45o-90o triangle relationships.
- 8.12 Apply the properties of parallelograms, rectangles, rhombuses, squares, or trapezoids.
- 8.13 Apply the distance formula.
- 8.14 Apply the formula for midpoint.
- 8.16 Identify point, line and plane as undefined terms and symbols for lines, segments, rays and distances.
- 9.1 Determine appropriate units and instruments for measuring a given quantity in a real-world context.
- 9.2 Estimate measurements, including length, area, volume, weight, time, temperature, and money.

**MATHEMATICS 6 – 12**

- 1.18 Formulate or identify systems of linear equations or inequalities to solve real-world problems.
- 3.4 Classify geometric figures (e.g., lines, planes, angles, polygons, solids) according to their properties.
- 3.15 Identify basic geometric constructions (e.g., bisecting angles or line segments, constructing parallels or perpendiculars)
- 3.16 Identify the converse, inverse, and contrapositive of a conditional statement.
- 3.17 Identify valid conclusions from given statements.
- 3.18 Classify examples of reasoning processes as inductive or deductive.
- 10.4 Apply number theory concepts (e.g., primes, factors, multiples) in real-world and mathematical problem situations.
- 12.0 Knowledge of mathematics as reasoning.

**Common Course Number: : MHF 4404**

**Unit 3** Chinese, Indian, and Arabian Mathematics

**General Outcome:**

**3.0 The student shall:**

Demonstrate a basic understanding of the role of the Chinese, Indian, and Arabian cultures to the development of mathematics

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1** Evaluate methods used by the ancient Chinese as discussed in “The Nine Chapters”
- 3.2** Compare and contrast Indian Trigonometry methods with those of the Greeks
- 3.3** Describe the development and use of the Hindu-Arabic place-value system.
- 3.4** Explain the use of the Chinese Remainder Theorem

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations.
- 4.6 Identify fundamental ideas that connect middle grades mathematics to advanced mathematics (e.g., trigonometry, number theory, pre-calculus, calculus).
- 5.7 Determine the prime factorization of composite numbers.
- 5.8 Identify the greatest common factor (GCF) and least common multiple (LCM) of sets of numbers.

**MATHEMATICS 6 – 12**

- 5.0 Knowledge of trigonometry

**Unit 4 Early European**

**General Outcome:**

**4.0 The student shall:**

Demonstrate a basic understanding of the role of the Early Europeans to the development of mathematics

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1 Critique geometry and trigonometry as used in medieval Europe
- 4.2 Describe the development and use of logarithms
- 4.3 Relate how the development of perspective changed the world of art.
- 4.4 Describe the application of geometry and astronomy to navigation and the exploration of the world
- 4.5 Explain the development of elementary probability
- 4.6 Describe the use of Pascal's triangle

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations
- 7.5 Determine probabilities of dependent or independent events.
- 7.6 Predict odds of a given outcome.
- 7.7 Identify an appropriate sample space to determine the probability of a given event.
- 7.8 Make predictions that are based on experimental or theoretical probabilities.
- 7.9 Apply counting principles to solve real-world problems.

**MATHEMATICS 6 – 12**

- 5.1 Identify equations of graphs of circular/trigonometric function and their inverses.
- 5.4 Solve real-world problems involving triangles using the law of sines or law of cosines.
- 5.5 Use tangent, sine and cosine ratios to solve right triangle problems.

**Unit 5**

**General Outcome:** Analytic Geometry and the Beginnings of Calculus

**5.0 The student shall:**

Demonstrate a basic understanding of the process of the development of Calculus.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1** Describe the goals of early calculus – to describe change and the area between curves.
- 5.2** Explain the fundamental theorem of Calculus
- 5.3** Describe the beginnings of integration
- 5.4** Relate the beginnings of differentiation

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations
- 4.6 Identify fundamental ideas that connect middle grades mathematics to advanced mathematics (e.g., trigonometry, number theory, pre-calculus, calculus)

**MATHEMATICS 6 – 12**

- 9.0 Knowledge of calculus

**Unit 6** Eighteenth and Early Nineteenth Century Mathematics

**General Outcome:**

**6.0 The student shall:**

Demonstrate a basic understanding of the developments in mathematics during the Eighteenth and early Nineteenth Centuries.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 6.1** Discuss the rise of logic and games as presented by Lewis Carroll
- 6.2** Describe the development and use of the metric system
- 6.3** Explore the role of conjecture and paradox.
- 6.4** Make the connection between differential equations and applications.

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations
- 3.0 Knowledge of mathematics through reasoning.
- 7.5 Determine probabilities of dependent or independent events.
- 7.6 Predict odds of a given outcome.
- 7.7 Identify an appropriate sample space to determine the probability of a given event.
- 7.8 Make predictions that are based on experimental or theoretical probabilities.
- 7.9 Apply counting principles to solve real-world problems.
- 9.3 Make conversions within the metric or customary systems in a real-world context.

**MATHEMATICS 6 – 12**

- 7.0 Knowledge of probability.
- 12.0 Knowledge of mathematical reasoning.

**Common Course Number: : MHF 4404**

**Unit 7      Late Nineteenth Century and Twentieth Century Mathematics**

**General Outcome:**

**7.0    The student shall:**

Demonstrate a basic understanding of the development in mathematics during the late Nineteenth and the Twentieth Centuries.

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 7.1**    Describe the connections between physics and mathematics as discovered by Einstein
- 7.2**    Illustrate the use of the binary and hexadecimal number systems and how they relate to computers
- 7.3**    Discuss the possibility of proving a theorem using a computer
- 7.4**    Explain the difference between Euclidean and non-Euclidean geometries

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0    Knowledge of mathematics through problem solving.
- 2.0    Knowledge of mathematical representations.

**MATHEMATICS 6 – 12**

- 10.4    Apply number theory concepts (e.g., primes, factors, multiples) in real-world and mathematical problem situations.
- 10.5    Identify numbers written in scientific notation, including the format used on scientific calculators and computers.

**Common Course Number: : MHF 4404**

**Unit 8 Mathematics Around The World**

**General Outcome:**

**8.0 The student shall:**

Demonstrate a basic understanding of the unique mathematical systems found in cultures not previously discussed

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 8.1** Describe contributions of the indigenous peoples of the Americas including the Mayans.
- 8.2** Discuss the contributions of African cultures
- 8.3** Explain developments in mathematics made by the Pacific Island cultures

**FLORIDA COMPETENCIES AND SKILLS MET:**

**MIDDLE GRADES MATHEMATICS 5 – 9**

- 1.0 Knowledge of mathematics through problem solving.
- 2.0 Knowledge of mathematical representations

**Common Course Number: : MHF 4404**

**Unit 9            Optional Topics Selected By Instructor**

**General Outcome:**

**9.0    The student shall:**

Demonstrate a basic understanding of the role of these various topics in the development of mathematics

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 9.1    Complete specific measurable outcomes determined by the instructor**