Course: Math 218 - History of Mathematics.

Catalog Description: 3 Hr. PR: MATH 155. Development of mathematics through calculus, with emphasis on mathematical theories and techniques of each period and their historical evolution. (Not offered on a regular basis.)

Semester: Fall 2015

Course Format: 2 hr Lecture. 1 hr Laboratory/Activity. 3 hr Credit

Prerequisites: Math 155 (Calculus with a C or better)

Instructor: Dr. Laura Pyzdrowski 411 Armstrong Hall, 293-2011 ext. 2358, lpyzdrow@math.wvu.edu

Schedule: Class: Tuesday & Thursday 10:00 - 11:15
Final: Thursday, December 10: 3:00pm to 5:00pm
Location: Room 422 Armstrong Hall
Office Hours: Tuesday and Thursday at 11:15 - 12:00 or by appointment

Course Objective: The main objective of this course is to become acquainted with some of the more prominent mathematical advances that have been made throughout our history and the people who made them. Dunham's book, *Journey Through Genius,* takes a "Great Theorems" approach to the history of mathematics whereby each chapter is dedicated to the history and development of a famous mathematical theorem. It is anticipated that readings from the book will be supplemented by other curriculum such as movies, interactive laboratory applets, and other readings and activities.

Expected Learning Outcomes: Upon successful completion of this course:

1. Students will be able to use algebra, calculus, geometry, discrete mathematics and problem solving strategies to solve authentic historical problems.
2. Students will be able to use concepts illuminated by concrete models to explain why properties of mathematics make sense.
3. Students will be able to develop formal and informal proofs and arguments using deductive and inductive reasoning.
4. Students will be able to demonstrate knowledge of the historical development of mathematics including contributions from diverse cultures.
5. Students will be able to use technological tools to solve problems involving the use of discrete structures and the applications of algorithms.
6. Students will be able to demonstrate the interconnectedness of mathematical ideas and how they build on one another and recognize and apply mathematical connections among mathematical ideas and across various content areas and real-world contexts
7. Students will be able to use technological tools to explore and represent fundamental concepts of mathematics.
8. Students will be able to work collaboratively while doing mathematics and will communicate mathematical ideas effectively, both while writing and speaking.
9. Students will be able to read and understand mathematics from a historical perspective in order to reproduce or solve mathematical problems.

Required Text:
Journey through Genius: The Great Theorems of Mathematics
Publisher: Penguin Books
ISBN: 978-0-14-014739-1

Equipment Needed:
Although students may not be allowed to use calculators for some assignments and tests, students are expected to have a calculator (a graphing calculator is not required) at each class meeting, lab and testing session. Cell phone calculators are not permitted, nor may calculators be shared. In addition to a calculator, students will be required to purchase and use a compass, protractor, and a straight edge.

Grading: Your final grade will be calculated using grades from homework and quizzes, written paper assignments (to be discussed in class), laboratories, activities, a journal and a portfolio.

Homework, Quizzes, Short Papers - 10%
Exams (Three Exams (30%) and Final (20%)) - 50%
Laboratories and In-Class Activities -20%
Journal - 10%
Portfolio - 10%
Total - 100%

Grade Assignment:
100 – 90 A
89 – 80 B
79 – 70 C
69 – 60 D
59 – 0 F

Grading Policy:
- There are no make-up exams except by prior arrangement with instructor.
- Late assignments will only be accepted at the next class meeting with a 10% penalty.
- Missed in-class laboratories will be made up during last class meeting. Students must be present in the laboratory to earn credit for doing the in-class laboratory assignments. Made-up laboratories can not be used in the portfolio which is due the last day of class.
- Exam grading appeals must be submitted in writing on the day the exam is returned.
- In-class activities and quizzes may not be made up.

Assignments: Assignments will typically be given once or twice weekly. Both individual and group assignments will be made. All group and individual assignments are weighted equally.

The Learning Outcomes for this course include that students will work collaboratively while doing mathematics and will communicate mathematical ideas effectively, both while writing and speaking. In order to facilitate your experiences, you will be assigned to a team. Ten percent of group laboratory/activity points are awarded for the ability to do and communicate about mathematics and to manage your time and follow directions. Any group laboratories/activities not submitted as a team effort (2-3 students), will not be awarded communication points.

JOURNAL REQUIREMENT

An assembled journal of mathematicians/cultures and their work is required. Purchase a small folder/binder (NO RINGS) and "tab and label" two main sections. A framework page will be provided and more information will be shared in class.

- *Section 1 (Mathematicians/Cultures)* of the journal will include a compilation of mathematicians/cultures and their contributions as well as other biographical and pertinent data.
- *Section 2 (Contributions in Specific Fields)* of the journal will include 6 subsections (each tabbed and labeled) that include mathematicians/cultures and their work with respect to contributions to specific fields: Algebra, Calculus, Geometry, Trigonometry, Probability and Statistics and Other Discrete Fields.
- It is anticipated that a mathematician may be listed several times throughout the journal. The journal will be used as you write several short papers during the semester. The journal will be turned in on the last day of class and is worth 10% of your overall grade. Your journal will not be returned.

PORTFOLIO REQUIREMENT

An assembled portfolio of assessment artifacts is required. Buy a small folder/binder (NO RINGS different from the Journal Binder) in which to place these items. A blank table of contents page will be provided and should be filled in and used as the first page in the portfolio. A title page which includes the appropriate, complete objective (including the numerical heading) should introduce *each* artifact. In addition, your introduction to the artifact should include a short explanation and reflection about the artifact. The binder will be turned in on the last day of class and is worth 10% of your overall grade. Your binder will not be returned. More information will be provided in class.

MATH 218 satisfies certain requirements for the National Council of Teachers of Mathematics accreditation process. This course will evaluate the following (the numerical heading corresponds to the designation by NCATE).

1.a.1.5 – Historical development and perspectives of number, number systems, and quantity including contributions of significant figures and diverse cultures

1.a.2.7 - Historical development and perspectives of algebra including contributions of significant figures and diverse cultures

1.a.3.10 Historical development and perspectives of geometry and trigonometry including contributions of significant figures and diverse cultures

1.a.4.6 - Historical development and perspectives of statistics and probability including contributions of significant figures and diverse cultures

1.a.5.6 - Historical development and perspectives of calculus including contributions of significant figures and diverse cultures

1.a.6.4 Applications of discrete structures such as modeling and designing data structures

1.a.6.5 - Historical development and perspectives of discrete mathematics including contributions of significant figures and diverse cultures

2e - Demonstrate the interconnectedness of mathematical ideas and how they build on one another and recognize and apply mathematical connections among mathematical ideas and across various content areas and real-world contexts

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor. Missed in- class assignments may not be made-up.

Inclusivity Statement: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu.

Academic Integrity: The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code:
http://studentlife.wvu.edu/office_of_student_conduct/student_conduct_code. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

Important Withdrawal Dates for the Semester: Oct. 23th to drop selectively, December 7th to withdraw from all classes.

This course has been certified as part of WVU's General Education Curriculum (GEC) Section 2A. Basic Math & Scientific Inquiry and 3.The Past and Its Traditions. As such, students are expected to use quantitative and scientific knowledge effectively and to apply knowledge, methods, and principles of inquiry to understanding the past. In addition, the course will focus, in part, on developing your ability to communicate effectively.

Tentative Schedule: the effective use of quantitative and scientific knowledge and application of knowledge, methods, and principles of inquiry to understanding the past is woven throughout the course. A compilation of problems from the textbook, laboratories, readings, and media assignments will be assigned on a weekly basis.

Week Topic (Short Chapter of book for readings and homework):

I. Introduction & Brief Introduction to Logic

II. Chapter 1 Hippocrates's Quadrature of the Lune

III. Chapter 1 Hippocrates's Quadrature of the Lune

IV. Chapter 1 Hippocrates's Quadrature of the Lune and **TEST 1**

V. Chapter 2 Euclid's Proof of the Pythagorean Theorem

VI. Chapter 2 Euclid's Proof of the Pythagorean Theorem

VII. Chapter 2 Euclid's Proof of the Pythagorean Theorem and Chapter 3 Euclid and the Infinitude of Primes

VIII. Chapter 3 Euclid and the Infinitude of Primes

IX. Chapter 3 Euclid and the Infinitude of Primes and **TEST 2**

X. Chapter 3 Euclid and the Infinitude of Primes and Chapter 4 Archimedes' Determination of Circular Area

XI. Chapter 4 Archimedes' Determination of Circular Area

XII. Chapter 4 Archimedes' Determination of Circular Area and Chapter 5 Heron's Formula for Triangular Area

XIII. Chapter 5 Heron's Formula for Triangular Area

XIV. Cardano and the Solution of the Cubic (Intro of Chapter 6) **and TEST 3**

XV. Sir Isaac Newton (Intro of Chapter 7)

Comprehensive Final