MATH 419 Introduction to the History of Mathematics

1. Catalog Description

    MATH 419 Introduction to the History of Mathematics   **4 units**

    Prerequisite: MATH 248 with a grade of C- or better and at least one upper division course in mathematics, or consent of instructor.

    Evolution of mathematics from earliest to modern times. Major trends in mathematical thought, the interplay of mathematical and technological innovations, and the contributions of great mathematicians. Appropriate for prospective and in-service teachers. 4 lectures.

2. Required Background or Experience

    Math 248 with a grade of C- or better and at least one upper division course in mathematics. The student should have had at least one year of elementary differential and integral calculus. Mathematical maturity of the student is required for full appreciation of the course. Junior or senior standing in mathematics is strongly recommended.

3. Learning Objectives

    The student should:

    a. Use historical perspective to enrich the teaching of secondary mathematics.
    b. Understand the correlation between the development of mathematics and the rise of our complex, technological society.
    c. Show that the development of mathematical symbols has extended the ability to express ideas precisely.
    d. Show that mathematics is continually developing rather than static.
    e. Show that mathematics develops as a result of human needs and ingenuity.

4. Text and References

    To be chosen by the instructor. Suggested texts include:

    - Boyer, Carl and Isaac Asimov, A History of Mathematics
    - Burton, David M., The History of Mathematics
    - Dunham, William, Journey Through Genius
    - Dunham, William, The Mathematical Universe
    - Eves, Howard, An Introduction to the History of Mathematics
    - Berlinghoff, William and Gouvea, Fernando, Math Through The Ages

    (Note: this text is elementary so it can be a good supplement that students can read on their own.)

    Other texts of a more innovative nature may be selected at the option of the instructor.

References:

The facilities of the Robert E. Kennedy Library at Cal Poly and the private libraries of the members of the Mathematics Department are used. Some of the more important references are listed below:

- Arnol'd, V. I., <u>Huygens and Barrow, Newton and Hooke: Pioneers in Mathematical Analysis and Catastrophe Theory from Evolvents to Quasicrystals</u>
- Ball, W.W. Rouse, <u>A Short Account of the History of Mathematics</u>
- Cajori, Florian, <u>A History of Elementary Mathematics</u>
- Dantzig, Tobias, <u>Number, The Language of Science</u>
- Gleick, James, <u>Chaos: The Making of a New Science</u>
- Kline, Morris, <u>Mathematical Thought from Ancient to Modern Times</u>
- Smith, D.C., <u>History of Mathematics</u>
- Struik, D.J., <u>A Concise History of Mathematics</u>

5. <u>Minimum Student Materials</u>

Paper, pencils, and notebook.

6. <u>Minimum University Facilities</u>

Classroom with ample chalkboard space for class use.

7. <u>Content and Method</u>

The instructor may wish to approach the subject from a chronological standpoint or by tracing the development of major concepts in mathematics, such as those of number, geometry, algebra, the use of symbols, functions and limits, etc., or may wish to use a combination of techniques. However, in whatever context, the course should include:

a. General historical background.

b. Greek mathematics including some emphasis on Pythagoras, the three problems of antiquity, deductive logic, Zeno's paradoxes, Plato and the philosophers, Euclid's elements and Archimedes.

c. The medieval period in Europe and the Renaissance.

d. The creation of calculus in the seventeenth century.

e. The construction of abstract mathematical systems, the contributions of Gauss and Euler, the solvability of equations, Cantor and set theory, topology, the influence of unsolved problems, the development of rigor in mathematics, etc.

8. <u>Methods of Assessment</u>

Homework, tests and scheduled examinations, with the possible inclusion of term papers and class presentations, at the option of the instructor.

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