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Fundamental Concepts in Elementary Mathematics for Teachers

MATH-010*

The course considers elementary school mathematics from an enriched point of view. Theoretical and pedagogical questions are raised throughout the course, and students are required to teach a one-hour enrichment class, once a week for 10 weeks, to grade 7 or 8 students in a local elementary school.

Textbook: Course Notes

sold through the University Bookstore and written by the instructor.

Prerequisite: None

Instructor: L. B. Jonker

Evaluation: Final Examination 15%

Class Participation 15%

Lab Reports 15%

Homework Assignments 55%

Outline:

• Enrichment material: This material rotates on a two-year cycle: Geometry in even years and numbers in odd years.

• The Numbers program:

- Number patterns and proofs
- Prime factors
- Rational and Irrational number
- Modular arithmetic and divisibility tricks
- Counting problems and probability

• The Geometry program:

- 3-dimensional geometry and the theorem of Pythagoras
- Similarity transformations
- Regular solids and the Euler number
- Areas and perimeters

• A critical examination of elementary mathematics: This material is included every year, modeled in class as much as in explicit discussion.

– teaching for understanding

– constructive learning in mathematics
– kinds of mathematical reasoning
– the role of problems
– abstraction in mathematics
– mathematics as language