

Syllabus

Math 01.205 Technological Tools for Discovering Mathematics

Catalog Description:

Math 01.205 Technological Tools for Discovering Mathematics 2 s.h.

(Prerequisites: CS 01.104 Introduction to Scientific Programming, Math 01.131 Calculus II, and Math 03.150 Discrete Mathematics with a grade of C- or better in all prerequisites)

This course will use mathematics-specific technologies to help students discover mathematics and to develop a better understanding of new content. Throughout the course students will become aware of the broad range of mathematics-specific technologies available to mathematicians, become proficient in the use of these, and pursue the advantages, disadvantages, and limitations of such technologies. Students will solve problems and advance their understanding of topics in the areas of pre-calculus, calculus, geometry, and statistics.

Essence of the Course and Outline:

The emphasis in this course will be on mathematics-specific technologies and on the discovery of mathematics using such tools. Throughout the course, students will become aware of the broad range of mathematics-specific technologies available and become proficient in the use of several of these. Some objectives of the course follow:

- Programming: Students will develop and use programs for graphing calculators and computers that illustrate mathematical concepts, simulate mathematical and probabilistic events, and carry out routine computations.
- Data Collection: Students will use calculator based probes to gather and analyze data, creating appropriate mathematical models to fit the data.
- Internet: Students will use geometry software to discover theorems in Geometry.
- Algebraic Symbolic Manipulation: Students will compare hand-held technology (TI-92 & TI-89) with symbolic algebraic manipulation capabilities to a computer application (Mathematica).
- Courseware: Students will evaluate commercially available mathematics software and examine shareware and public domain software available on the Internet.

Required Technologies:

- Geometry discovery software - Geometer's Sketchpad & Tesselmania - for discovering geometry properties and developing spatial visualization skills.
- *Mathematica* - emphasis on mathematics modeling.
- Using spreadsheets as a tool for investigation statistics, discovering mathematics, and problem solving.
- Mathematics word processing (Math Type or Equation Editor)
- Graphing calculators - emphasis on using programming for problem solving and on the utility of programming in forcing logical thinking and precise mathematical communication.
- CBL Calculator Based Laboratory) or CBR (Calculator Based Ranger) - for data collection and discovering the relationship between reality and mathematics modeling.
- Resources for mathematicians available on the Internet.

Optional Technologies:

- Additional geometry Software such as Cabri Geometry, Geometry SuperSupposer software, Logo (programming language) and other software associated with spatial visualization (Gyrographics, The Right Turn, Building Perspective, Kaleidomania, and The Super Factory).

- Other computer algebra & numerical systems
- SPSS, Fathom or other statistical software programs

Texts:

Goldberg, Kenneth, Using Technology for Problem Solving in Middle and High School Mathematics: Investigations Using Scientific & Graphing Calculators, Spreadsheets, & the Geometer's Sketchpad, 2007, Pearson/Merrill/Prentice Hall.

Hicks, Jensen, Lewis, Exploring Algebra I with TI-Nspire, 2009, Key Curr. Press & Texas Instruments

Ameis, Jerry, Mathematics on the Internet: A Resource for K-12 Teachers, 3/E, 2006, Pearson/Merrill/Prentice Hall.