

ROWAN UNIVERSITY
Department of Mathematics

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 introduces students to a broad range of available mathematics-specific technologies. Students will become proficient in these technologies through hands-on practice, and see the advantages, disadvantages, and limitations of each through comparative studies. The emphasis in the course is on using technology as a tool for strengthening their problem solving ability and their understanding of topics in the areas of pre-calculus, calculus, geometry, and statistics.

OBJECTIVES & CONTENT:

- 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 CalculatorBased 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).

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- 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..