

MATH 01-205-1 Technological Tools for Discovering Mathematics (2 s.h.)

Spring 2012: Wednesday 3:15 pm – 4:55 pm

Robinson 325 Computer Lab

Instructor: Dr. M. Herman

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Office Phone: 856-256-4500 ext 3539

Office: Rowan University Mathematics Department

Robinson Hall, 2nd Floor

Office Hours: by appointment (set up on email)

Required Technology

(students are responsible for items noted in red print)

*Email will be used as a communication tool between Dr. Herman and students. Email from Dr. Herman will be sent to students' Rowan email accounts throughout the semester.

*Graphing Calculator (TI-83/84 or TI-89)

*Silver USB cable for Windows/MAC (\approx \$14)

http://education.ti.com/educationportal/sites/US/productDetail/us_connectivitycable_silverusb.html

*TI-Nspire handhelds and software will be provided for use in class

*TI-Connect and TI-Nspire Computer Link software and link cords will be provided for use in class

*Access to computer software will be provided on campus.

Required Texts

(students are responsible for items noted in red print)

* readings saved on course CD (provided in class)

* Kenneth P. Goldberg. 2007. *Using Technology for Problem Solving in Middle and High School Mathematics: Investigations Using Scientific and Graphing Calculators, Spreadsheets, and The Geometer's Sketchpad*. Upper Saddle River, NJ: Pearson. ISBN-13: 9780131181816

* Jerry A. Ameis, and Jazlin V. Ebenezer. 2006. *Mathematics on the Internet: A Resource for K-12 Teachers* (3rd Ed). Upper Saddle River, NJ: Pearson. ISBN-10: 0131715828, ISBN-13: 9780131715820

* Judy Hicks, Lauren Jensen, Nathaniel Lewis. 2009. *Exploring Algebra I with TI-Nspire*. Key Curriculum Press & Texas Instruments. ISBN 9781559539661

Course Objectives

Students will use graphing calculator handhelds and software (TI-73, TI-83/84, TI-89, TI-Nspire), and data collection devices (CBR, CBL), and software and resources on computers to investigate and develop deep mathematical understanding of various topics. Software may include programs and applications (APPS) on graphing calculators, *TI-Connect*, *TI-Nspire Computer Link*, *TI-Interactive*, *TI-Navigator*, *Excel* spreadsheets, *PowerPoint*, *Equation Editor (Math Type)*, *Geometer's Sketchpad*, *Cabri Geometry*, *Tinkerplots*, *Fathom*, *SPSS*, *Mathematica*, and applets and other resources for mathematicians available on the Internet.

Objectives for using the mathematics-specific technologies introduced in the course include problem solving, data collection and analysis, simulation of real-world events, mathematical modeling, logical thinking, programming, use of Computer Algebra Systems, construction and manipulation of geometric figures, and communication of mathematical ideas via word processing. Students will also evaluate and compare capabilities of the various technologies.

Catalog Description of Course

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. (Prerequisites: Intro to Scientific Programming and Calculus I)

Disabilities and Special Needs

Disabilities and special needs are documented at the Office of Disability Resources in the Academic Success Center in Savitz Hall (x4233 or x4234). Students who wish for special services must provide a Notification of Accommodation letter from the Office of Disability Resources to the instructor as soon as possible at the beginning of the semester. The instructor is not responsible for providing accommodations until she receives the notification letter.

Withdrawal Policy

Students will be updated on their overall course grade after each midterm exam and any time by request (typically on email). Dates and policies regarding withdrawal from the course will follow Rowan University protocol, including the three deadlines for withdrawal during the semester. Note that the university's policy on course withdrawals during the last four weeks of the semester is that a student may withdraw only if there are circumstances beyond his/her control which prevent him/her from completing the course requirements.

Academic Honesty

All work on individual assignments must be your own. The penalty for a cheating offense will minimally be an automatic zero (0) on the related assignment, up to an automatic F in the course with a report to the Provost's Office. Procedures regarding dishonesty will follow Rowan University policies, as outlined in the Academic Honesty portion of the Student Information Guide available online.

Class Participation -- Attendance and Punctuality

Students are expected to arrive on time and attend class regularly, and will sign an attendance sheet at the beginning of class on a daily basis. The course is highly hands-on with technology and involves numerous in-class activities designed as learning experiences. Each class meeting will include some time for students to complete mathematical investigations using technology, and student participation is required during every class meeting. Students are expected to turn in responses to each assignment during the same class meeting, and there will be **no make-ups** for missed work.

Class participation will count in course grades. That is, missing class will negatively affect a student's grade, including a drop of one-third of a letter grade for each class missed (e.g., A to A-). Acquiring missed notes will not suffice in terms of catching up on work, and the course instructor will not re-teach activities to students who miss class. Any graded assignments turned in late as a result of an absence will result in a grade of zero (0) up to a maximal score of **half** the credit of the completed work.

Grading Procedures

5% - Class Participation (Individual):

40 points

See attendance policy above.

45% - Weekly Quizzes (Individual):

12 * 30 = 360 points

At the end of each class meeting, students will take home an assignment (math problems, software reviews, website reviews) that is due at the **start** of the following class meeting.

Math Problems: Students are expected to complete each problem and turn in a detailed solution showing all captured screens from technology (e.g., graphing calculator images) if applicable.

Software Reviews: Students are expected to experiment with software and turn in a written summary and critique of the software, at times comparing the functions of one type of software to another.

Website Reviews: Students are expected to visit each given website and turn in a written summary and critique of the website.

20% - Readings Reviews (Individual):

2 * 80 = 160 points

Students are expected to read each distributed article, following the schedule provided on the course calendar. For each of the two Reading Review Assignments, a set of questions will be provided to prompt written discussion of ideas presented in the readings. Students will be asked to show strong evidence of actually doing the readings. That is, responses to questions should reveal that students have definitely read the assigned articles and found the answers from the main points made by authors in the articles. Students may also be asked for their own opinion statements.

30% - Project (Partners): Technology-Enhanced Investigation -- Written Project and Presentation

240 points

Students are expected to pick a project topic (get topic approved by course instructor) and then work on projects and use resources outside class to go beyond what was learned in class. Students should use guidelines for the development of technology-enhanced problem-solving investigations in mathematics presented in K. Goldberg's book (pp. xiii-xiv) and E. Glazer's article (2003). Students will present projects and provide handouts to the whole class. Along with presenting projects, each student will evaluate other students' presentations. Some sample project ideas follow:

- Mathematical investigation of any problem or data of interest to the group using various technologies
- Further exploration and use of any software mentioned in syllabus and/or class
- Investigation of at least three mathematical software programs other than those listed in this syllabus such as educational software for classroom use or test preparation software
- At least two activities and/or lessons using mathematics software suitable for grades 6-12
- Evolution of development and use of TI graphing calculators (e.g., TI-83 family now includes TI-84)
- Research on the development and use of graphing calculators other than TI brand (e.g., Casio, HP, RadioShack)
- Development and/or use of applets
- Test preparation software

Total:

800 points

Grading Scale Cut-Offs

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
93 %	90 %	87 %	83 %	80 %	77 %	73 %	70 %	67 %	63 %	60 %