

MATH 639, Sec. AA
Topics in Technology in Math Education
Winter 2017

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Office Hours: By appointment and before & after class.

Visualization: What is mathematical visualization?

"Visualization or visualization is any technique for creating images, diagrams, or animations to communicate a message. Visualization through visual imagery has been an effective way to communicate both abstract and concrete ideas since the dawn of humanity. Examples from history include cave paintings, Egyptian hieroglyphs, Greek geometry, and Leonardo da Vinci's revolutionary methods of technical drawing for engineering and scientific purposes.

Visualization today has ever-expanding applications in science, education, engineering (e.g., product visualization), interactive multimedia, medicine, etc. Typical of a visualization application is the field of computer graphics. The invention of computer graphics may be the most important development in visualization since the invention of central perspective in the Renaissance period. The development of animation also helped advance visualization."
Source: Wikipedia

"Mathematical visualization is an aspect of geometry which allows one to understand and explore mathematical phenomena via visualization. Classically this consisted of two-dimensional drawings or building three-dimensional models, while today it most frequently consists of using computers to make static two or three dimensional drawings, animations, or interactive programs. Writing programs to visualize mathematics is an aspect of computational geometry."
Source: Wikipedia

Course Objective: We will begin the course by familiarizing ourselves with Mathematica and Wolfram Alpha, the organizational and computational environments in which we will be working. *Please note that familiarity with Mathematica and/or Wolfram Alpha is not assumed.* I have written up a set of relevant and easy-to-follow

Mathematica tutorials focusing on visualization techniques and will be posting them on our Moodle website.

Each of you will be working on an individual project toward an educational (MTM) or analytical (MSc) project and summarize it as a Mathematica “slideshow” or “research article.” We will discuss the expected nature and details of the projects and the accompanying slideshows or research article in class.

Assessments:

MTM		MSc	
Pedagogical Research	20%	Mathematical research	20%
Midterm	20%	Midterm	20%
Educational project	20%	Analytical project	20%
In-class presentation	10%	Research article	10%
Pedagogical skills	20%	Analytical skills	20%
Class participation	10%	Class participation	10%

Laptops: Math 639/652 will be taught in the departmental Conference Room LB-921.04. In order to follow it, you must bring to class a laptop running Mathematica and make sure that its battery is fully charged. If you do not have your own laptop, you can borrow one from the Webster Library.

Software: The course requires Mathematica 10 or higher. Earlier versions of Mathematica may not have some of the features used. Concordia University has a site license for Mathematica and all registered students are entitled to install Mathematica on their personal computers free of charge. The process of installing Mathematica is described on your MyConcordia web portal. Internet access during lectures will be required. Please note that you must have a Concordia e-mail address to activate Mathematica.

Mathematica & Wolfram/Alpha: Mathematica and Wolfram/Alpha are part of a teaching, learning, and research environment developed and supported by Wolfram Research. They have become dominant mathematical research tools around the globe. In addition, thousands of users have written so-called “demonstrations” that solve problems and provide illustrations of topics ranging from mathematics to science, the arts, and entertainment. You will be able to use these as sources of inspiration for choosing relevant project themes.

Attendance: You are expected to attend and participate in the lectures. If you cannot attend a lecture for any justifiable reason, you must inform me of your potential absence ahead of time.

Moodle: MATH 639/652 is managed on a Moodle website. The site will contain the course outline, lecture notes, research material, announcements, sample slide shows and sample projects, feedback material and other items.

Since only registered students have access to the website, all material on the site is confidential to you, your classmates, and me. No material posted on our website will be used elsewhere without your explicit written permission.

Communication: E-mail exchanges in this course are managed through the Moodle forum and use the Moodle e-mail system.