

Math Animated

A web hosted courseware of undergraduate calculus for physics and engineering students, with animated and interactive graphics. www.mathanimated.com

1. Math for Physics Undergraduates

Even the most elementary courses of physics cannot be taught without a necessary mathematical background.

One option is to have introductory math courses before starting any physics. Having both in parallel is not satisfactory, except if some math studies are added in the physics classes.

In the early 1970s an experimental **one semester course "Mathematical Introduction for Physicists"**, was introduced in Tel-Aviv University to replace the original three semestrial calculus given by the math department. The new course was given by a physicist; some mathematical proofs were omitted, and the physical meaning of mathematical notions were emphasized. In order not to loose the mathematical rigour, the students continued to have one semester of calculus given by the math department. This procedure was successful and was adopted since.

2. Motivation

When I retired a few years ago, my accumulated teaching time of "Mathematical Introduction for Physicists" was more than 10 years, and I took **the challenge to benefit from my teaching experience and adopt new technologies for transforming the course into a web hosted courseware.**

The web **allows the courseware to be available at any time and place needed.** It also allows the educator to project any part of the courseware in class.

A fascinating feature applicable in math education today is interactive and animated graphics, making abstract notions easy to understand. The use of raster graphics for this purpose has been falling behind the rapidly growing SVG (Scalable Vector Graphics) in the last decade. Raster graphics are large files, resulting in long download times and slow animations. In addition, recently released browsers made a giant progress in displaying SVG natively.

3. Choice of Software

The Web Consortium (W3C) is a non-profit organization. It developes and promotes XML, an **open source software technology**, and issues recommendations for its application. The courseware adopts this technology, which **uses coding in plain English that can be viewed by anyone, and written easily without the requirement of a professional programmer.** It can be compared in this respect to the commonly used LaTeX for scientific papers, although XML is much richer and versatile.

The XML technologies used include XHTML for text, MathML for mathematical expressions, and SVG for more than 110 animated and interactive graphics. The free browser Firefox 3.0 has native support for these technologies, and **can render the courseware without the need of any proprietary software.**

4. Enjoy Math Animated

The **Math Animated** website www.mathanimated.com contains the necessary instructions for enabling you to run the courseware: You should install the free browser Firefox 3.0. **Firefox is compatible with three of the most popular computer platfoms: Windows, Mac and Linux.** The system requirements are mild, and are usually met without any need of upgrading.

After following the instructions, you may immediatly access genuine parts of Math Animated, including text of lectures, exercises with self-evaluation ability, and interactive animated graphics.

Enjoy!

*Samuel Dagan
Tel-Aviv University
dagan@post.tau.ac.il*