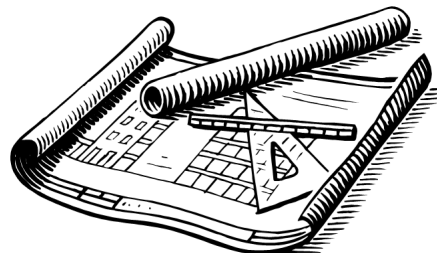


Scientific Graphics

(Phys 206)
Spring 2025

What am I doing here? This is a brief introduction to scientific and technical graphics. Every experimental scientist and engineer has to make drawings as part of the process of their work, and they are the main method of communication with machinists and other manufacturers. In this course, you will learn the basic rules of freehand sketching and lines types, creating isometric drawings and other projections, 3-view machinist's drawings, dimensioning and tolerancing, symbols, threads, sectioning, vector graphics and layering in Office, color models, creating and editing raster images (photographs) using GIMP and imageJ, creating animations in PowerPoint, plotting computational results in Mathematica and with "design mode" in Excel, and using "Sketchup" for 3D modeling.



Can I get a book? Sure! But you don't have to. The standard text for machinist's drawings is *Technical Drawing*, by Giesecke, Mitchell, Spencer, Hill, etc. (Prentice Hall Publishers). I think the current edition is the 12th, (ISBN 0-13-008183-3) but any edition would be good enough.

Do I need to buy anything? Not really. In a 'real' drawing class, you'd have to buy a lot of stuff, including a drawing table, a T-square, some architects rules, erasing shields, a 'French' curve set, and lots of other things. For this overview course, I think you should have the following:

- | | |
|------------------------|-------------------------------|
| a good ruler | a 30-60° triangle |
| some pencils | a bow compass |
| a circle template | a good white eraser |
| some clean white paper | an isometric ellipse template |

We'll make do with these things. Many are available in the college bookstore, or at WalMart. The compass and templates might be the hardest to find.

How will I be graded?	Assignments:	60%
	Participation:	20%
	Final:	20% (Friday, May 9, 3:30 pm; 1 hour)

Participation: The final participation grade is capped at 100 participation "points", but you begin the semester with 300 points. You lose 80 points each time you miss a class (including week 1, even if you weren't signed up yet). You lose 60 points each time you arrive at class more than 10 minutes late. You lose 20 points each time you're late by less than 10 minutes. You lose 40 points each time I ask you to do something in class and you refuse to try. So, you can skip two classes and still be at the maximum grade. Your participation grade cannot be negative.

What software do I need? You need Microsoft office, NIH ImageJ, Gnu GIMP, A Trimble Sketchup account, and Wolfram Mathematica. All this software is either free or already provided by the college for you.

Assignment Summary:

In accordance with college policy, you should expect to work on the assignments for an average of 2 hours per week throughout the semester to be able to pass this course. A few weeks will be shorter than that, and a few weeks longer than that. For multi-week assignments, you should never expect to complete the assignment in a single day.

	Start Date	Due Date	Topic
Assignment 1	January 27, 2025	February 3, 2025	Isometric Sketching
Assignment 2	February 3, 2025	February 10, 2025	Tools (ruler, compass, triangle)
Assignment 3	February 10, 2025	February 17, 2025	Three-view Machinist's Drawings
Assignment 4	February 17, 2025	March 3, 2025	Microsoft Office Drawings
Assignment 5	March 3, 2025	March 17, 2025	PowerPoint Animations
Assignment 6	March 17, 2025	April 7, 2025	Quantitative Results with ImageJ
Assignment 7	April 7, 2025	April 14, 2025	Photography & Editing in GIMP
Assignment 8	April 14, 2025	April 21, 2025	Scientific Animations in Excel
Assignment 9	April 21, 2025	April 28, 2025	Graphics in Mathematica
Assignment 10	April 28, 2025	May 9, 2025	Using Sketchup

Learning Outcomes

At the end of this course, students will:

- Be able to identify appropriate techniques used in machinist's drawings.
- Be able to create adequate 3-view machinist's drawings.
- Be able to make adequate isometric drawings and scientific diagrams by hand and in Microsoft office.
- Understand the basics of scientific photography.
- Be able to manipulate and edit scientific raster images in GIMP, including the use of alpha channels.
- Be able to make measurements from scientific images using ImageJ.
- Be able to make scientific animations using PowerPoint, Excel, and Mathematica.
- Create 3D models in Sketchup.

College Policies that are not specific to this course:

<https://bulletin.geneseo.edu/content.php?catoid=22&navoid=958>