THAYER SCHOOL OF ENGINEERING AT DARTMOUTH

Winterim Course

Computing Before Electronics

Dates: December 9–12, from 9am to 12pm

Instructor: H. J. Frost

Intended Audience: Dartmouth students of science and engineering

Prerequisites: Multivariable calculus (Math 8 or equivalent).

Objectives:

- Learn a little about the history of technology.
- Gain an appreciation of the trade-offs among precision, accuracy, and ease of computation.
- Reinforce appreciation of natural distributions of experimental data: Logarithmic scales; Normal distributions; Weibull distributions; and so forth.
- Have some fun with some interesting old gadgets.

Description: How did mankind survive and thrive before the advent of integrated circuits and handheld electronic calculators? After all, the need for numerical calculations originated with the commerce of early civilizations and intensified throughout the industrial revolution and into the modern age. The answer lies in the large variety of mechanical gadgets and graphical techniques invented since the enlightenment and widely used until well after the middle of the 20th century — some even to this day. In this course we will study the development of a few of these, so as to understand the mechanics and mathematics upon which they are based, concentrating on four types:

1. Slide rules;
2. Planimeters and Integrators;
3. Mechanical digital calculators;
4. Nomograms and specialized graphical charts.

Each class will include a lecture with demonstrations, followed by a session of hands-on application and experimentation by the students using original instruments and historical techniques.