

Analog Electronics

Course Short Name: **Electronics**

Prereq: Very good high school math (AP useful but not required) Accessible <===|+=|===> Hard

Overview

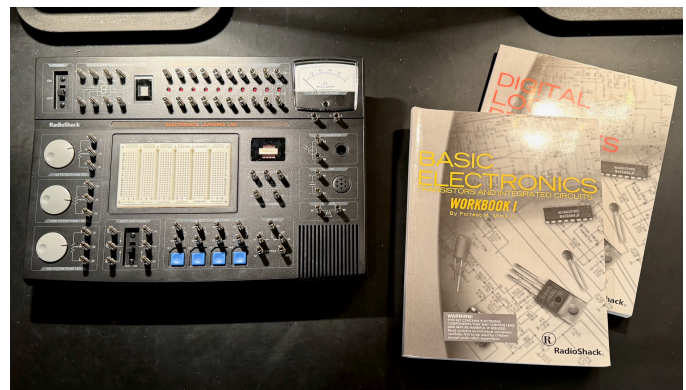
Radio Shack was founded in 1921. At its peak in 1999, it had 8,000 stores, but in 2015, it was bankrupt. Radio Shack's arc was the inevitable result of the arc of the electronics industry:

- There was a Frankenstein era going all the way back to the roots of the field where devices were expensive, dangerous, and not very capable. As vacuum tubes became mass produced in the 1920s, the Frankenstein era started to close. By the 1950s, radio and television were consumer items.
- In the 1960s the transistor was invented from fundamentally new materials called semiconductors, and this ushered in a Goldilocks era, where it became far easier to build circuits, and lots and lots of savvy people went to Radio Shack, bought parts, and taught themselves to do it. The synthesizer is among the many creative products of this era.
- The success of the semiconductor era ushered in the HAL 9000 era. The discrete transistor was almost completely replaced by miniature versions of itself replicated *en masse* in integrated circuits and silicon wafers, and even in the most mundane circuitry like that in toasters and thermostats, the componentry became hidden in epoxy-coated boxes that the consumer had no way and little reason to tinker with. Digital circuitry and computers became ubiquitous.

What is the point, today, of tinkering with circuits containing a few discrete components when a general-purpose chip with billions of transistors is already in your pocket? Well, the point is to understand electronics, and be among the few empowered to do new things with electronics.

Materials

In this course, we will return to the Goldilocks era and work through the same materials that countless hobbyists in the 1970s and 1980s used to learn electronics. This is an incredible sweet spot that, like Radio Shack, is well on its way to being forgotten. The materials of the Goldilocks era were hands-on, accessible, and educational. Even though Radio Shack is gone, their kits, some in very good condition, still float around used on eBay. A well-preserved one is pictured at right.



Our course will have some theory, but your time will be dominated by hands-on work with the Radio Shack kits and companion texts authored by Forrest Mims. We will spend about ten weeks of the semester building Mims' introductory circuits, and then in the final few weeks, we'll budget time for each of you to choose a more advanced circuit to build independently.