Physics

PHYS S-123. Laboratory Electronics: Analog and Digital Circuit Design (CRN: 30203)

Thomas C. Hayes JD, Lecturer on Physics, Harvard University
Noah Charles Helman MS, PhD Candidate in Applied Physics, Stanford University

This course surveys practical electronics, from Ohm's Law through microprocessors, with little mathematical or physical explanation but much opportunity to design and build circuits. Each of the 4-hour meetings devotes about 2.5 hours to a laboratory session. The small class size allows a format closer to seminar than to ordinary lecture. Since the course aims above all to enable students to design useful circuits, it concentrates on the most effective techniques, analog and digital: operational amplifiers and microprocessors. The analog half of the course moves quickly from fundamentals (resistors, capacitors) to design with transistors, bipolar and field-effect, and the many applications of feedback, using operational amplifiers. The digital half of the course looks briefly at discrete-gate design, then at analog-digital interfacing. Students will apply programmable logic devices (PLDs, often called PALs), programming these through a logic compiler (ABEL). Somewhat more than half of the digital content concerns the design of microcomputers, microcontrollers, and their interfaces. The laboratories conclude with a series of seven sessions in which each pair of students constructs and programs a microcomputer. The course is not difficult, but it absorbs a great deal of time. Enthusiasts among our students often spend extra hours in the lab beyond the required sessions.

PHYS S-1ab. Principles of Physics (CRN: 30610)

Cumrun Vafa PhD, Professor of Physics, Harvard University
David Morin PhD, Assistant Director of Undergraduate Studies in Physics, Harvard University, Lecturer on Physics, Harvard University

This survey of classical physics stresses topics important for life science applications. The first half of the course covers kinematics and dynamics, conservation laws, elasticity, and fluid mechanics. The second half of the course covers electricity and electric circuits, magnetism, waves and optics, and nuclear physics. This course fulfills the requirement of two semesters of physics for entrance to medical school.