EE J-term Course ENGR296
Introductory Topics in Electrical Engineering: A Make/Build/Discover Adventure

A hands-on project-oriented course with enough basic theory to understand what you're doing, taught through construction of useful devices (hand held multimeter, etc). Taking advantage of the j-term format, the course will focus on making things, developing practical skills (circuit prototyping, soldering, etc) and venturing out to exciting locations to see electrical engineering in action (engineering firms, power plants, broadcast networks, etc.). The course offers an opportunity for students of all backgrounds to consider electrical engineering as a discipline, and provides EE students a skills practicum and topical introduction to concepts they will study in the EE program.

Theoretical/Hands-on Content:
(Covered in a very contextual manner, to minimize scientific rigor and maximize fun and interest)

- Analog Electronics
  - Voltage, current, resistance
  - Power supplies, resistors, wires, tools, etc
  - Basic circuits (measuring resistance, voltage drops and currents, demonstrating laws)
  - Fun circuits (diodes, amplifiers, etc)
  - Other components as time and interest permit (capacitors, op-amps, etc)

- Digital Electronics
  - Basic concepts of logic (from a philosophical/theoretical/problem-solving perspective)
  - Logic from the electronics perspective (AND, OR, NOT)
  - Data and decision making (Input conditions >> decision parameters >> output)
  - Basic digital electronic circuits (simple voting machine, other design examples)

Math Content
(A brush-up and re-characterization of important mathematical tools, covered in a user-friendly environment. Not intended to challenge the students mathematically, but to ease the transition from previous theoretical math learning to understanding it for applications in EE.)

- Algebracadabra
- Log rolling
- Sines of the times (sinusoidal functions as signal characterizations rather than computational tools)
- Pythagoras, reliance on the impossible, and the magic of complex algebra (that's a "j" not an "i")
- Binary beauty and hex appeal

Project Content

- Selected lab experiments as dictated by chosen content: focus on fun, simplicity, accessibility
- Larger project to tie it all together and provide students with a tangible result (multimeter or other)
- Teach basic skills: breadboarding, soldering, lab tools, etc

Industry Content

- Visitors from Industry to bring perspective, examples and stories
- Tours of local establishments with examples of electrical engineers in action. Current connections that can provide tours include:
  - Xcel energy power plant
  - MPR engineering (studios, satellite uplink/downlink center, transmitter site, etc)
  - Try for: Bell/Qwest/Centurytel, 3M, Medtronic, Honeywell, …
  - Other connections through faculty, their contacts, and senior design sponsors