Electrical Engineering: Enabling a Smart World

Welcome!

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What Do Electrical Engineers Do?

Sensors
-camera
-light
-motion
-touchscreen

Power
-battery
-energy harvesting
-energy management
-power grid

Circuits
-analog & digital
-transistors
-electrophysics
-nanoelectronics

Communication
-wireless transceivers
-coding
-networking

Algorithms
-image/video
-audio
-data

Processors & Storage
-microprocessors
-graphics
-flash memory

Who makes *this* work?

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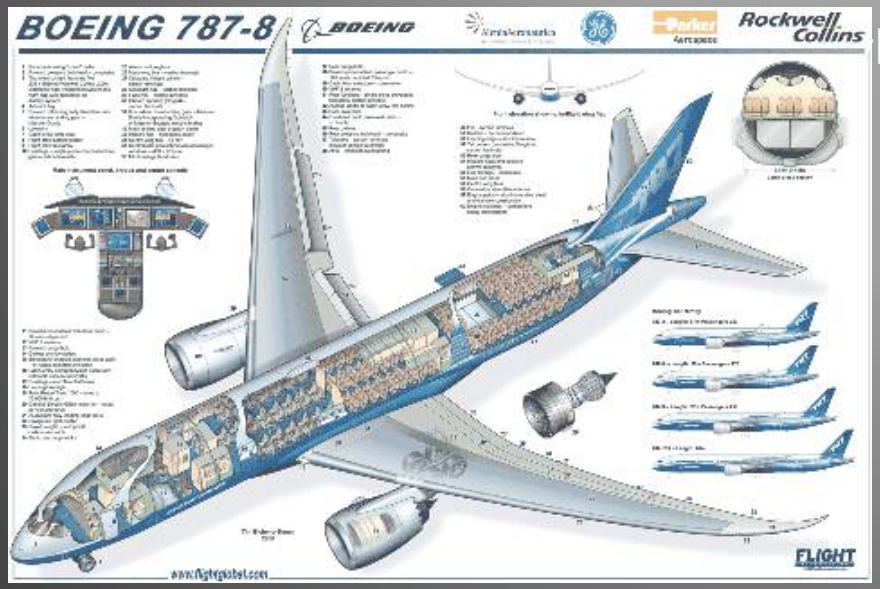

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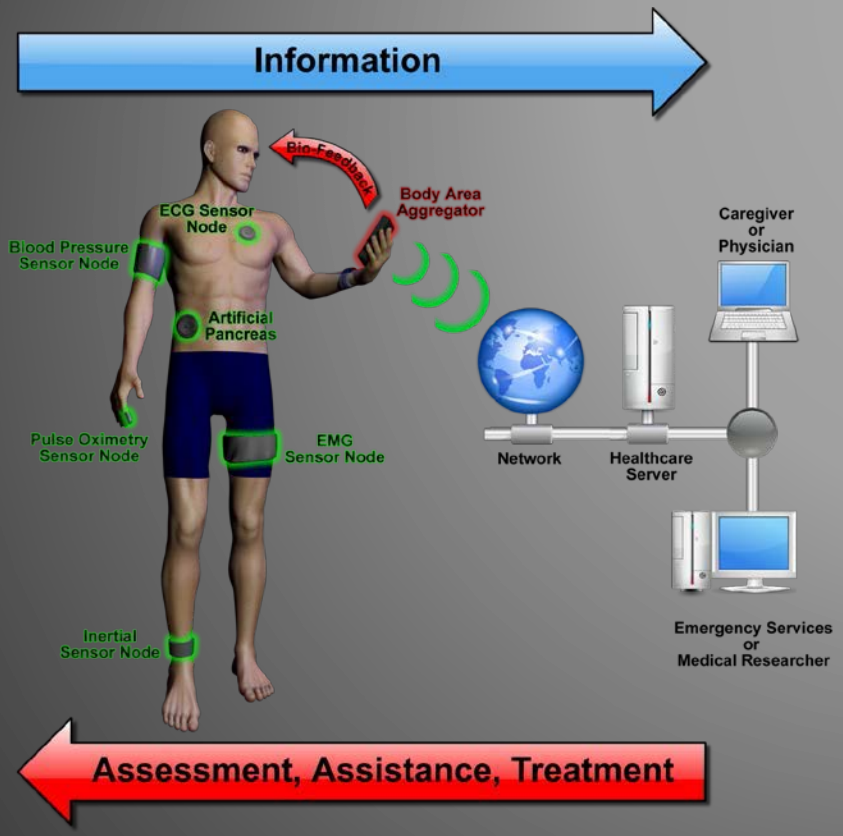

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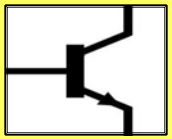
What do UVA EE Graduates Do?

Current jobs from 55 UVA EE grads, 3-5 years after graduation

Engineering



Systems Analyst
EE for Babcock and Wilcox
Application-Specific Integrated Circuit Designer
radar systems analyst
EE at AAI Corporation, Textron
Front End Software Engineer
EE dealing w/GPS – military
Officer and Flight Test Engineer, U S Air Force
EE for government R&D
design power distribution and control systems
Test Engineer Naval Surface Warfare Center
design high-performance data converters
RF/Microwave Design Engineer
EE working on a voice/data communications
Energy Engineer for an energy consulting firm
Satellite System Engineer
Hardware Engineer

Law/Medicine

Patent Examiner
patent attorney
Attorney
patent examiner US Patent Office
Lawyer
Work for government
Lawyer
General Surgery Resident
Library assistant

Grad School

In EE, CpE, CS, BME, Library Sc.

Yale
Harvard
Stanford
UCLA
Michigan
Texas at Austin
UVA (2)
Other (3)

Finance

Marketing exec
Entrepreneur
Asset Management
Consultant
healthcare-focused private equity fund
in charge of a start up that I founded
Strategy & Planning - merger and acquisition
Banker

Information Tech

web consultant
IT Consultant
web developer
Software Developer
Entrepreneur
IT/Management Consultant
software/system engineering
Director of Information Technology

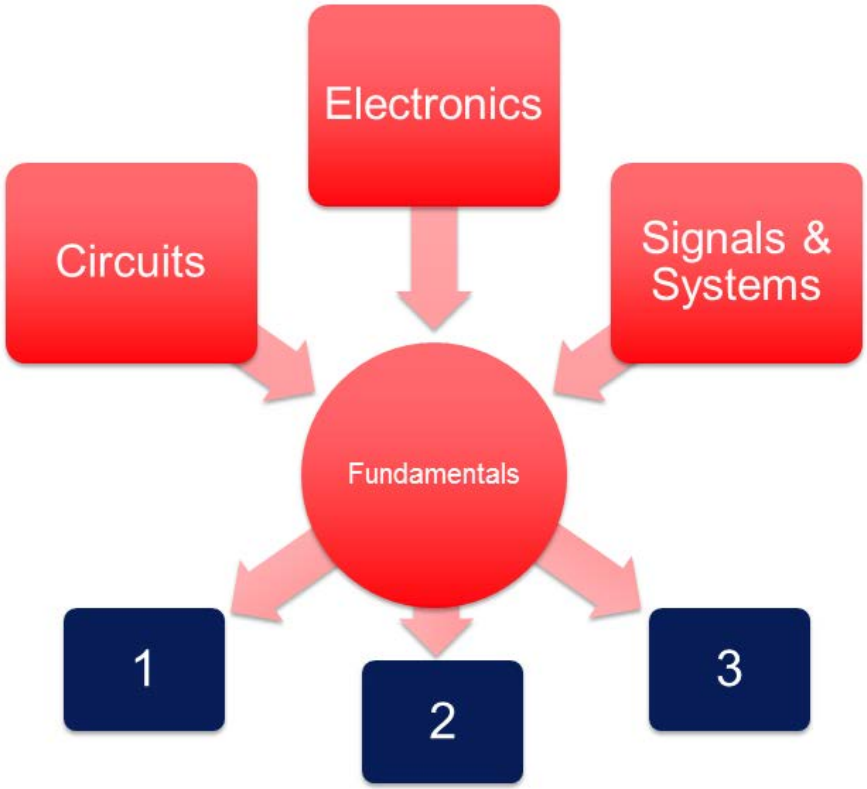
Our Electrical Engineering Program at UVA

ECE Undergraduate Curriculum Assessment Study

- Outcomes driven – what should a student know and be able to do upon graduation?
- Inputs:
  - Surveys of graduates
  - Professional Engineers Exam
  - Industry input
  - Feedback from current students
- Key Findings:
  - Increase emphasis on hands-on learning
  - Improve integration across courses and curriculum

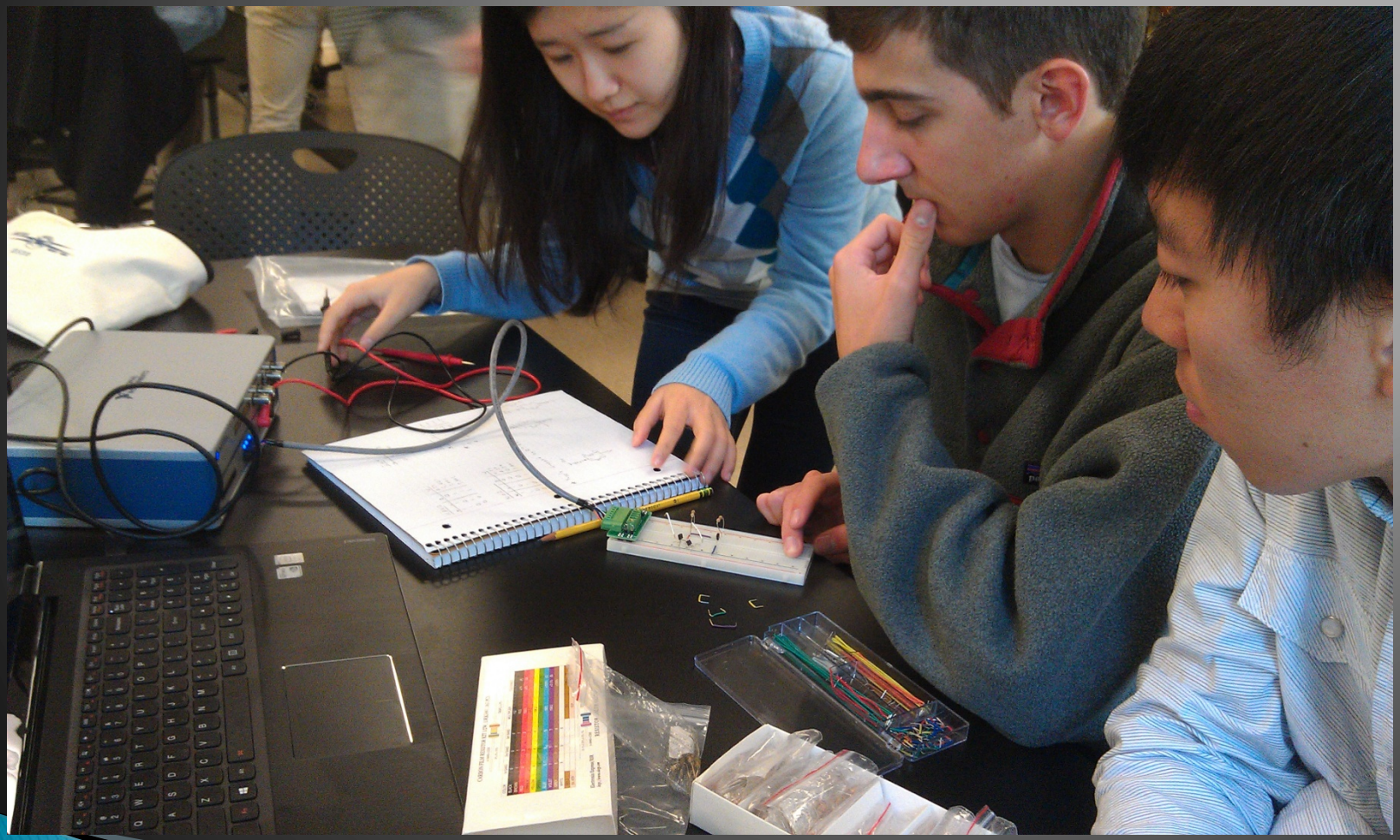
Implementation of New Undergraduate Curriculum

- Combine first three basic ECE courses (formerly Circuits, Electronics, and Signals and Systems) into ECE Fundamentals I, II, and III



The “Old” Way

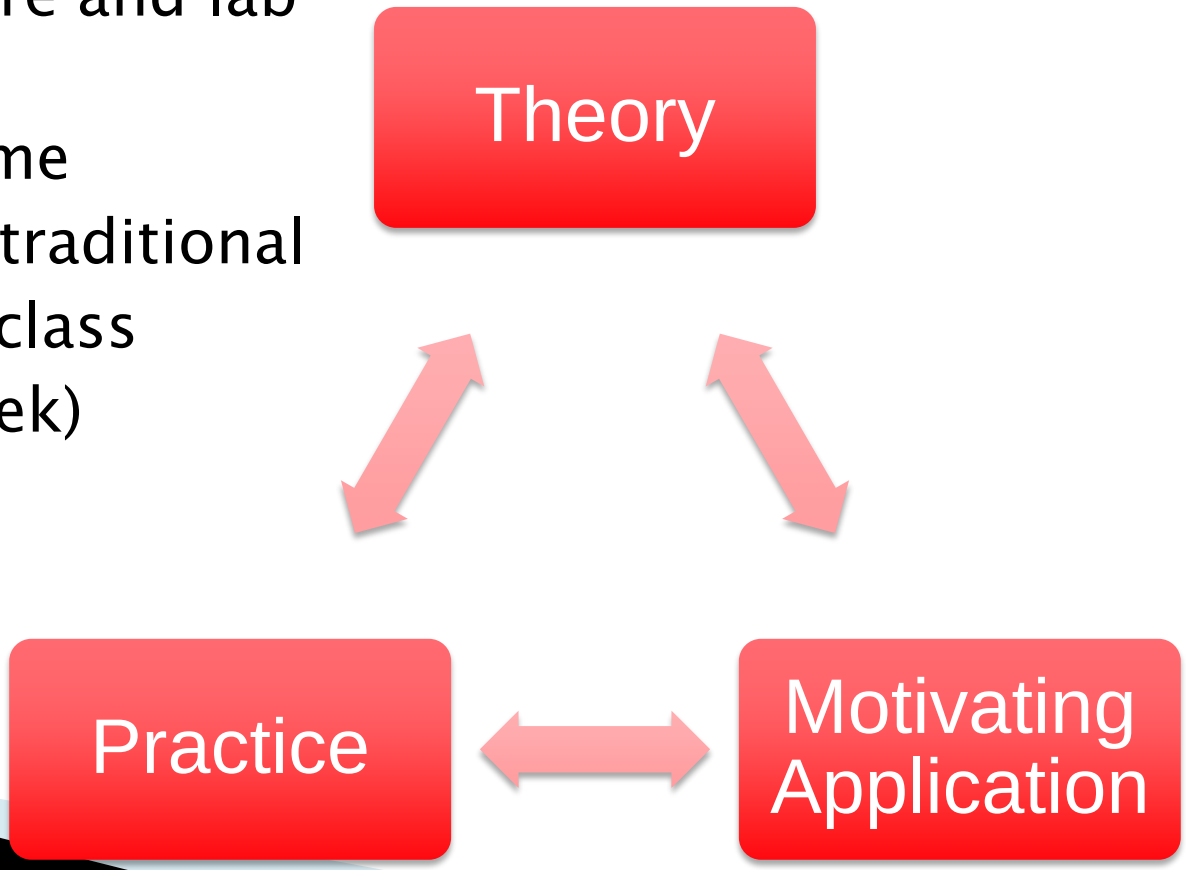
The “New” Way
Integrated Lecture and Labs



Learn by doing

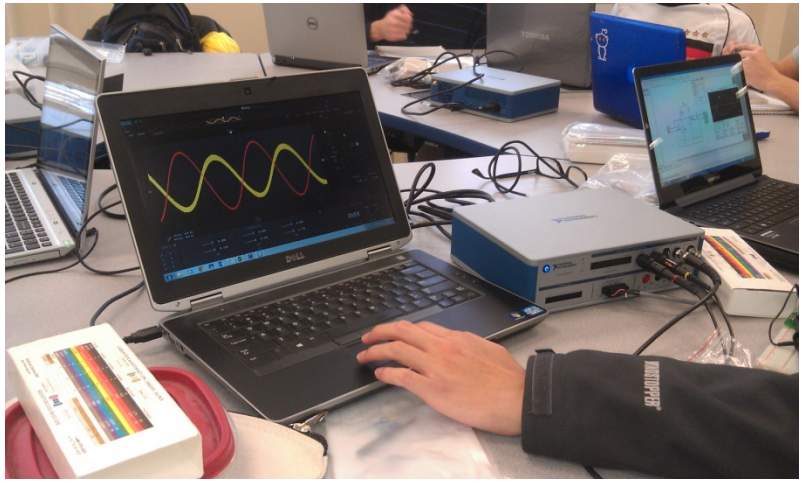
Implementation of New Undergraduate Curriculum

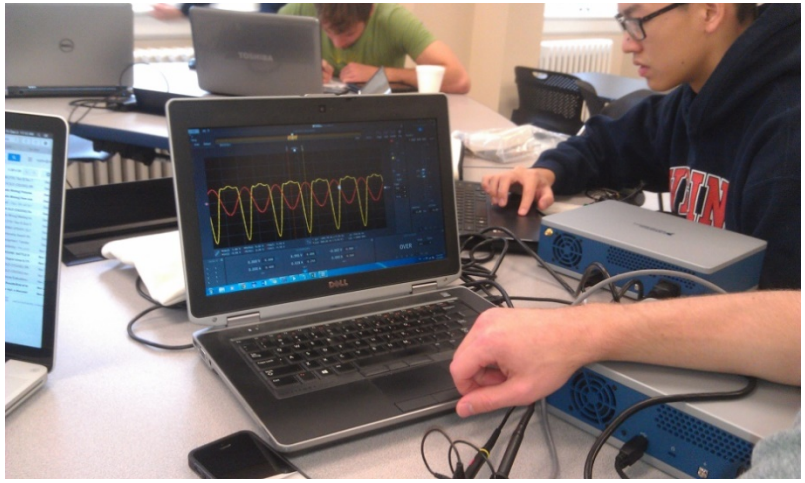
- Most required courses to be taught in studio format
  - Combined lecture and lab sessions
  - Total contact time equivalent to traditional lecture + lab class (~5 hours/week)

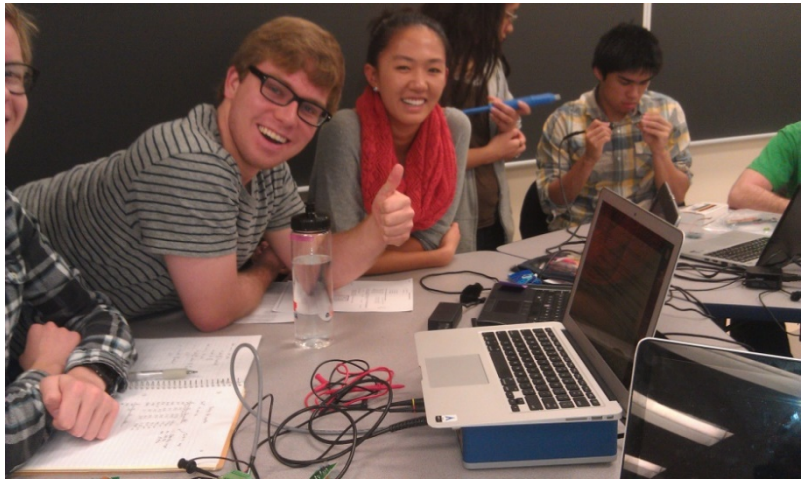


Studio-Style Classroom

ECE Fun I







Undergraduate Teaching Assistants

Darden Court

Darden Court

Darden Atrium

National Instruments (NI) Engineering Design Laboratory

NI Engineering Design Laboratory

Charles L. Brown Department of Electrical and Computer Engineering
at the University of Virginia

March 19, 2016

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ECE@UVA

Our EE and CpE undergraduate programs are fully ABET accredited

Core required ECE courses include significant hands-on content and are taught in the studio format

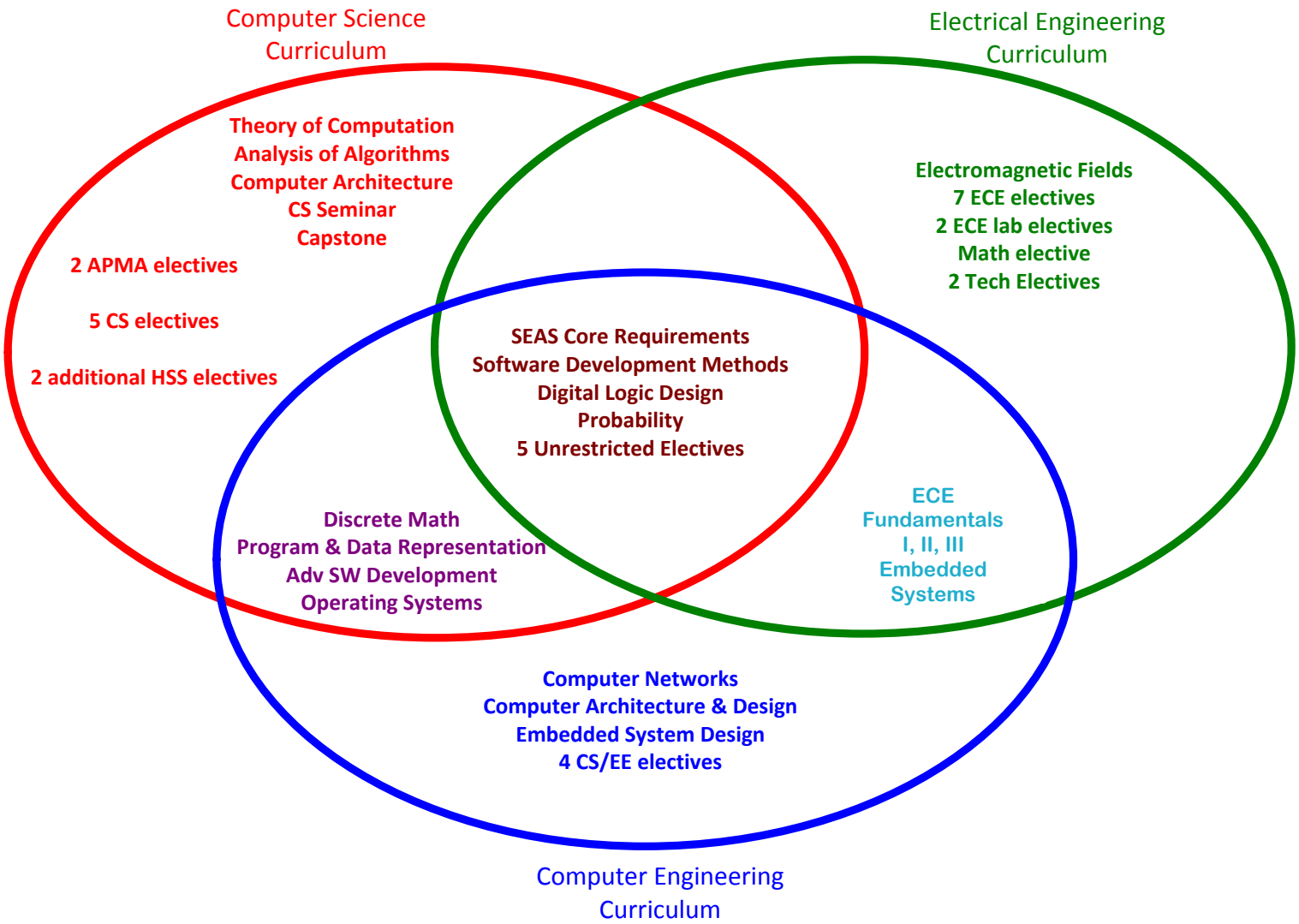
Our faculty includes many IEEE Fellows and two NAE members

Our graduate and research programs offer many opportunities for undergraduate research experiences

The faculty in the ECE department have received more University-level teaching awards per capita than any other unit at UVA

Questions?

Make sure to visit our student project demonstrations in Thornton A-120

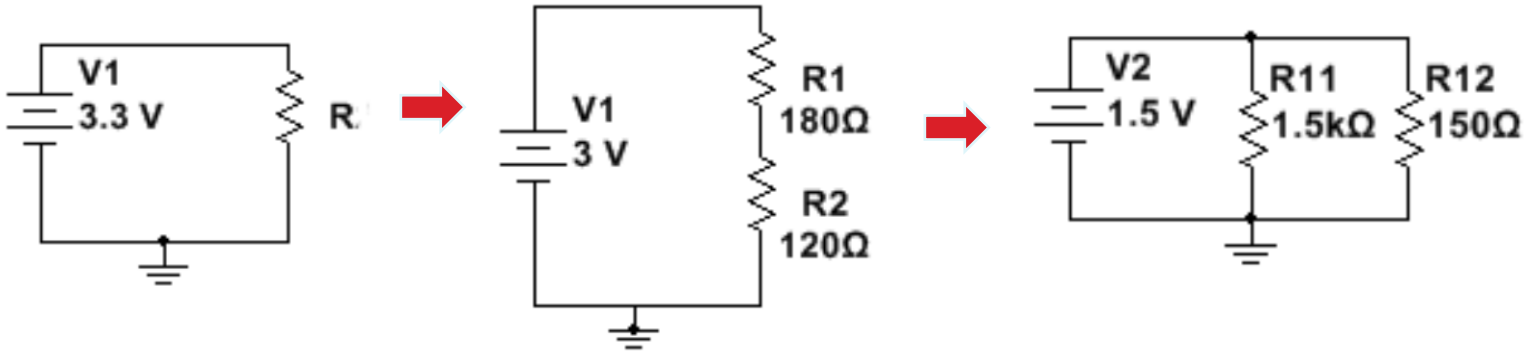


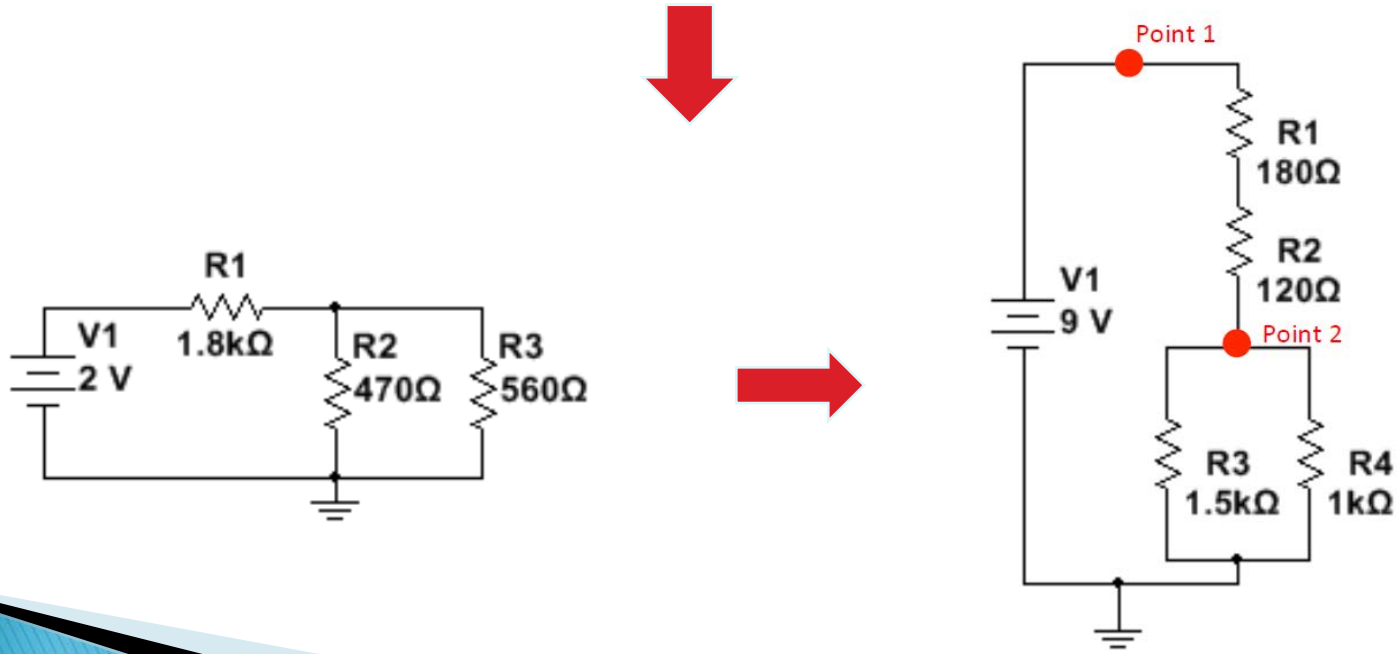
Relationship between requirements for Computer Science, Electrical Engineering and Computer Engineering

Example: Fun I – Week 3

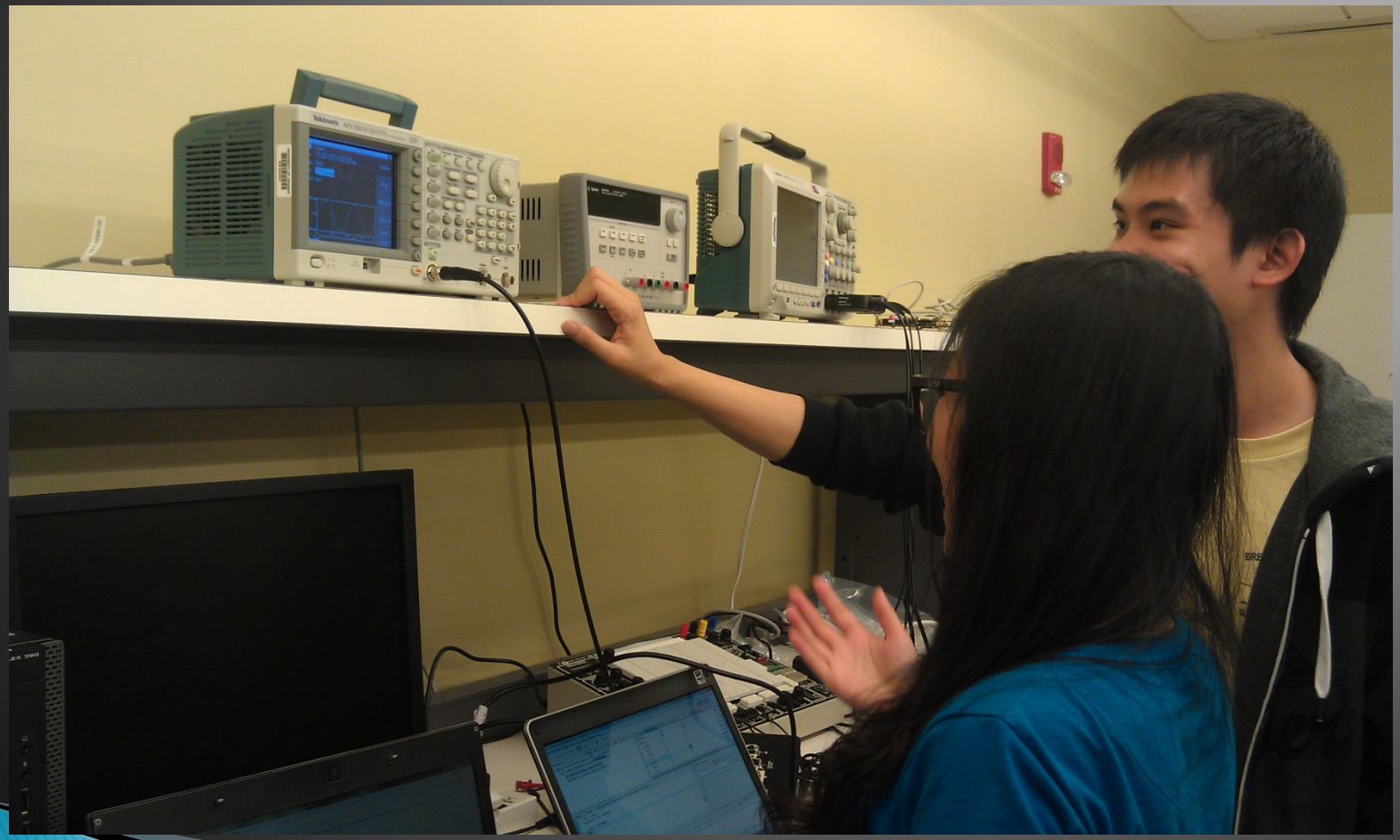
- Topics
  - Basic circuit analysis using KVL & KCL
  - Intuitive analysis: circuit simplification
  - Energy conservation
  - Voltage and current dividers
  - Analysis of more complex resistive circuits (multiple loops, single source)
  - Series and parallel simplification, when are resistors in series and when in parallel
  - A simple example of a resistive circuit with two independent sources
- Labs
  - Multimeter DC measurement of current in a loop with a resistor and an independent voltage source.
  - Plotting relationship between voltage and current through various resistors
  - Measurements to confirm energy conservation
  - Taking measurements in voltage and current dividers
  - Measurements of series and parallel resistive circuits and their simplifications
  - Measurement of results in a circuit with two independent sources

Sample Lab from Week 3
Voltage and Current Dividers



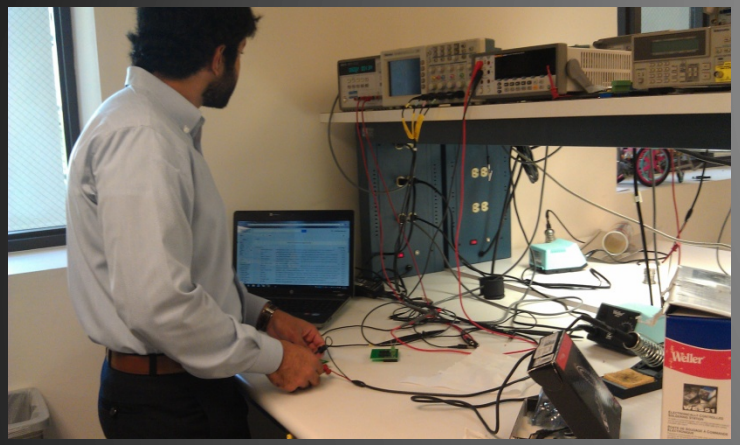


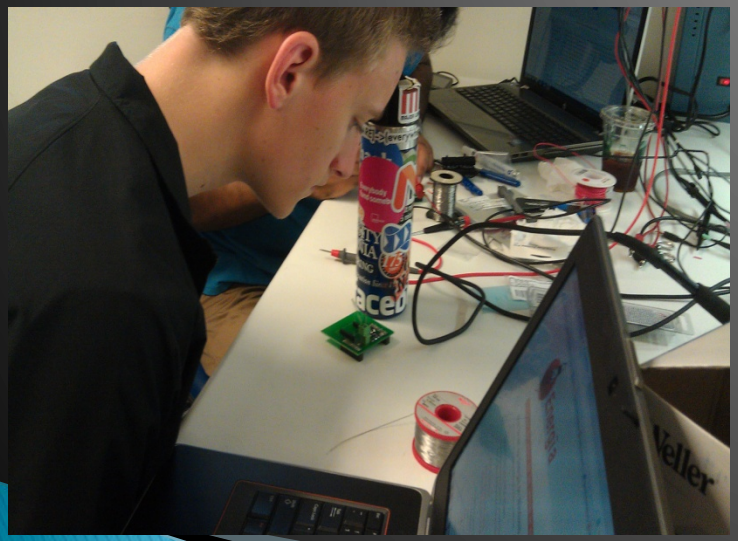
Projects-Based Upper Level Coursework

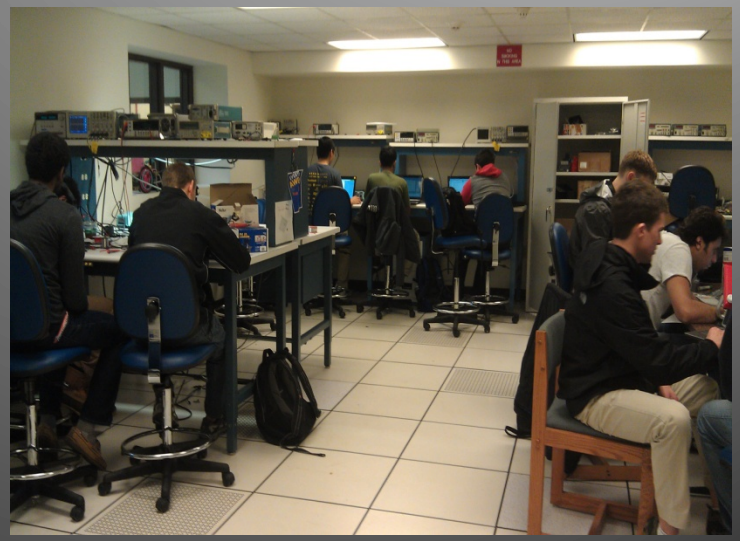


Introduction to Embedded Computing

Lab Based Upper Level Electives







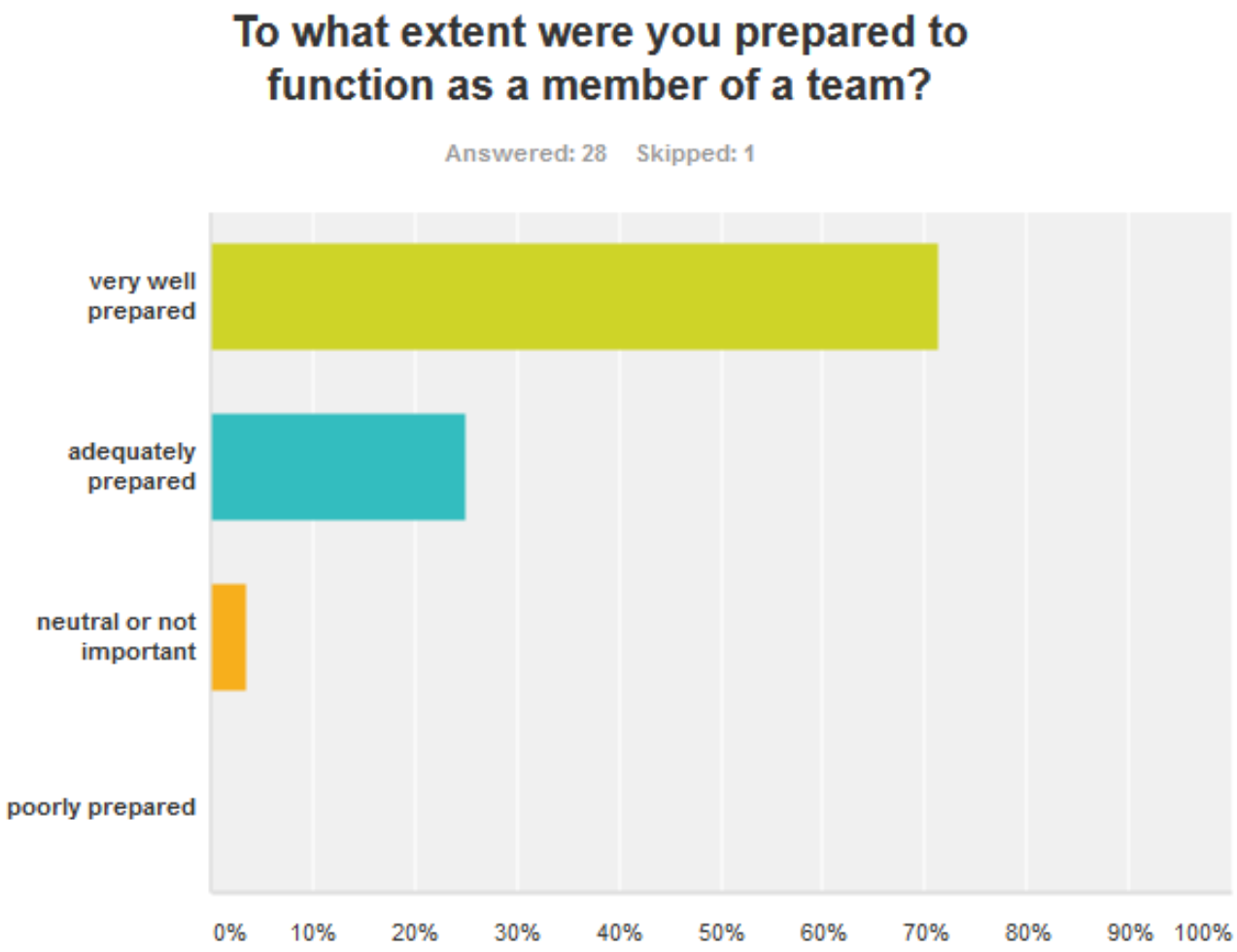
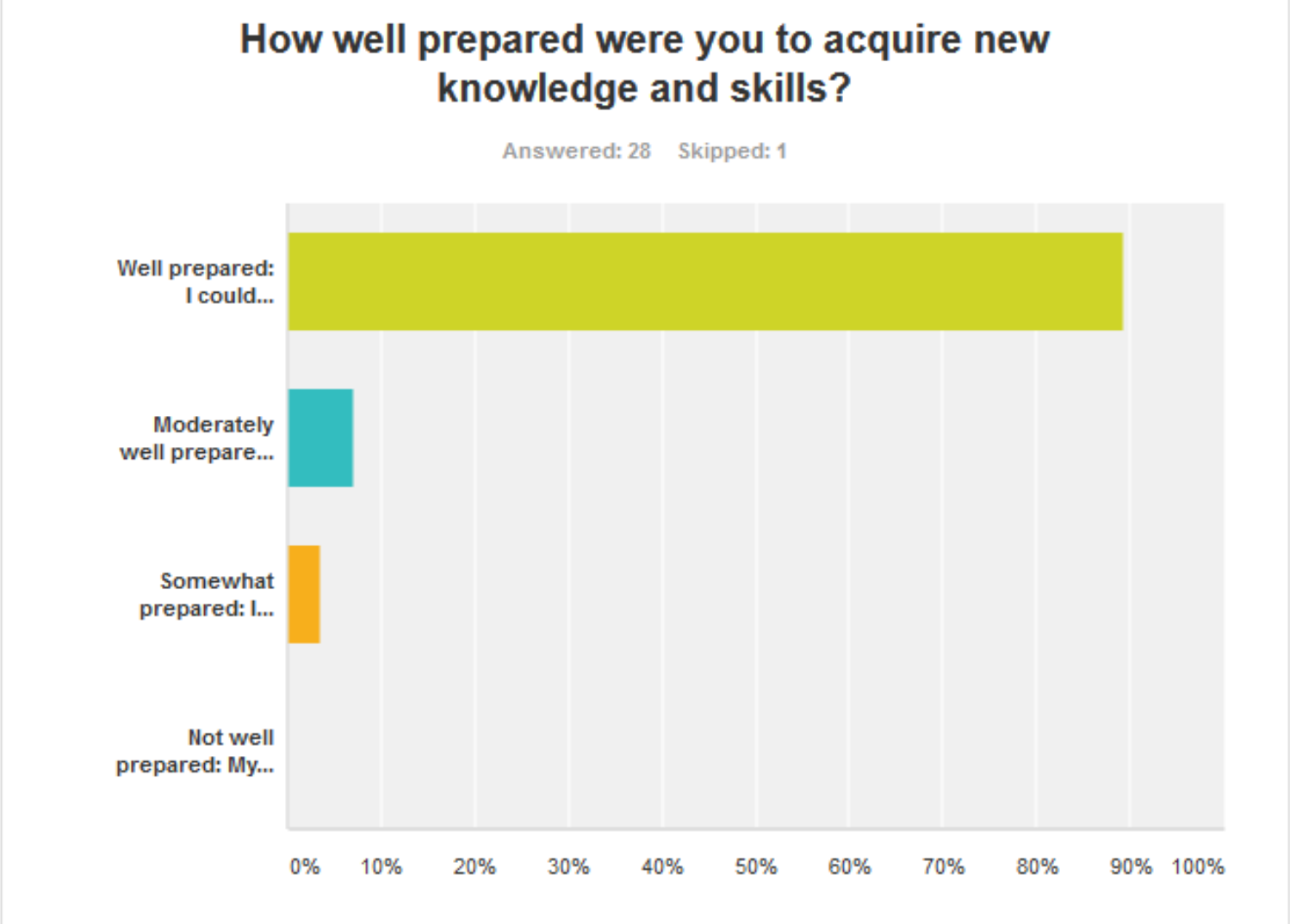
Design Your Own Experiment Class

Using Undergraduate TA's

We've discovered several advantages to using undergraduate TA's in the lab

- Undergraduate TA's have been through the same course and can relate to the current students better
- Undergraduate TA's are not conflicted between research and teaching as graduate TA's can be
- Peers can demand more of peers with less resentment (they are all in this together)
- Undergraduate TA's apply for the position and thus it can be seen as an honor to be asked to help
- Undergraduate TA's learn and retain the material better because of seeing it again as TA's
- Undergraduate TA's become vested in the course and make suggestions for improvement from the student perspective

Alumni survey results (3-5 years out)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