Undergraduate Committee Report

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Introduction

- This year a major revision in undergraduate core classes was initiated.

- These changes require modifications in other classes and development of new classes.

- Our committee also undertook a thorough evaluation of the curriculum outside the core.

- This talk summarizes our recommendations for curriculum changes and requirements.
Motivations for Change

- Core curriculum put in place 15 years ago.

- The field of EE has grown and changed.

- Students have different perspectives, skills, and interests than in the past.

- EE undergrad enrollment has been flat or dropping – under 100 students most years.
Goals of the New Curriculum

- “Hook” students into EE early on.
- Streamline/improve lower division requirements to tie in better with the major.
- Make core classes more parallel and complementary, and add labs to each class.
- Improve the specialty sequences and the options for capstone design courses.

Make the EE major more rewarding and more fun.
Core Changes

Old Core

101
102
103
111
112
113
121

New Core

101a
102a
108a
101b
102b
108b

* Signals and Systems
  * Electronics
  * Digital

* All have been taught at least once
Student Feedback on Rollout

- Students like the flexibility in the new core and the ability to start specialty sequences earlier.

- New classes need further refinement, the workload is high in some cases.

- Need more specialty and capstone design classes in some areas.

- Too much digital at expense of device physics.

- Better coordination of scheduling (not all W/S)

More detailed feedback in committee report
Curriculum Components (03/04)

- Lower division math and physics (45 units)
  - Math/Physics 50 series, Stat or Prob.
- 3 Eng. Fundamentals (E40) and Programming
- Electromagnetics (EE141) or Physics of EE (EE41)
- Core: Electronics, Signals/Systems, Digital
- Analog Design Lab (EE122)
- Specialty Sequence (3 classes)
- Capstone Design Class
- Other (EE100, EE102E, TIS, total units, HUMs).
Core Prerequisites

- Currently, none of the core classes require any EE or Engineering lower division classes.
- In particular, E40 (Introductory Electronics) is not required.
- **We recommend** that E40 be removed as an EE requirement.
  - Currently serves both EE and Engineering students
  - Most EE students really like it, and will continue taking it to satisfy the engineering requirement.
  - Can recommend students take it prior to the core
Do we need an “Intro to EE”? 

Arguments for: 
- The core should have an intro class to preview/synthesize what is to come. 
- This could “hook” students into EE. 

Arguments against: 
- Not possible for one class to introduce all of EE. 
- The new curriculum has many different hooks into EE (freshman seminars, E40, EE41, EE42). 
- Don’t want to add another required class. 
- Class (and instructor) don’t currently exist.
An Exploratory Option

- Start a small projects-based class that introduces electronics, SS, and hardware.
  - Build a MARs rover, soccer-playing robots, etc.

- Not required
  - Could start as a freshman/sophomore seminar

- If successful, push to make it an E class.

Any volunteers to develop this class???
EE Physics

- Students currently satisfy this requirement with either E&M (EE141/EE141M) or EE41
  - Somewhat unbalanced, should we address this?

- EE41 – Physics of EE – W04 (23 students)
  - 5 units: 4 hours of lecture, 3 hour lab per week.
  - Electrostatics (Solgaard)
  - Transmission Lines and Wireless (Inan)
  - Fiber Optics (Solgaard)
  - Semiconductor Physics and Diodes (Miller/Horowitz)
  - Optoelectronic Devices (Miller)
  - MOS (Horowitz)
Laboratory Requirements

- All core classes have a lab component.
  - Not clear we need other lab requirements.
  - Capstone design class is typically a lab class.

- Need for EE122 (Analog design lab) as a requirement was revisited:
  - Overlaps with 101b laboratory.

- We recommend that EE122 be removed as an EE requirement.
Capstone Design Classes

- We don’t have a formal definition of what constitutes a “capstone design class”.
  - Loosely designed around ABET requirements
  - Requires significant component be open-ended design (50% design units), group projects also desirable.

- The following classes are now approved by the AAC as capstone design classes:
  - EE109 (Digital), EE118 (Mechatronics), EE133 (Communications Lab), EE134 (Photonics), EE144 (Wireless), EE168 (Imaging) EE189B (Software), EE206 (Control), EE262 (2D Imaging), EE265 (DSP).

Would like more: add other existing classes?
“Hooking” EEs: Freshman Seminars

- Freshman seminars introduce freshman to exciting areas in a small group setting.
  - 16 students maximum, no exams, 3 hours/week

- Freshman seminars are a great recruiting tool and highly rewarding for students and faculty

- EE is the only engineering department that does not offer freshman seminars
  - Once upon a time, could get billets/$$$ for this.

- Our committee has recruited a pool of 9-12 faculty to offer seminars every 2-3 years
  - Counts the same as teaching regular EE courses
Inaugural Seminars for 04/05

- Bernd Girod
  - How cyberspace works

- Tom Lee
  - Things about stuff

- David Miller
  - How musical instruments work
Other Lower Division Issues

- We recommend that Physics 53 (Mechanics) no longer be required.

- We recommend that students can apply 1 EE class to their 45 units of required math/science.

- We should emphasize E154,155ab as alternatives to Math 51-53.
Specialty Sequences

- Electronics
  - Class added on devices (EE116) and bipolar (EE215)

- Signal Processing and Communications
  - EE168, 268, 265 added as capstones

- Controls

- Fields and Waves
  - EE134 (Capstone), EE141*, EE222, EE223, EE235 added.

- Computer Hardware
  - EE109 (Capstone) added, EE282 changed.

- Computer Software
  - *Can’t count as both EE Physics and Specialty
EE CORE

- **EE141**
  - Either 141 or 41 reqd.

- **EE178 or Stat116 or Math 151 or E155C**

- **EE101B**
  - EE101A

- **EE102B**
  - EE102A

- **EE108B**
  - EE108A/E102E

Specialty Required ENGR(3)

Freshman/Soph

- **Math 51, 52, 53 or E154, E155AB**
  - Phy55

- **Math 41, 42 (HS)**

Soph./Junior

- **EE141**
  - Either 141 or 41 reqd.

- **EE178 or Stat116 or Math 151 or E155C**

- **EE101B**
  - EE101A

- **EE102B**
  - EE102A

- **EE108B**
  - EE108A/E102E

Freshman Seminars

*EE41 and EE42 may become E courses*
Open Issues

- Revitalize CSE Major.
  - 4 of 6 core classes, including EE108ab
  - Core classes in CS

- How to make mezzanine courses more accessible to undergraduates.

- How does overseas study fit into the curriculum.

- Generate courselets on basic topics
  - Matlab, Spice, Calculus, etc.

- Interdisciplinary classes?
Summary

- Major changes to curriculum
- Bugs and gaps remain
- Open questions and issues to address
- Hopefully no longer delayed gratification with nothing at the end.