AGENDA

- Overview [this slide]
- Goals [discussion & vote]
- Example proposals [discussion & vote]
- Course Specifics [discussion & vote]
Goals

- Curriculum needs focus/definition
- Prepare grads for HW+SW industry
- Provide multiple tracks
- Improve course-to-course consistency
- Introduce HDLs early; use them
- Emphasis on real-world examples
- Introduce new CE-specific courses
- Others?
Curriculum Proposals

Program Focus [PR/recruiting]
- Internships? Research?
- Tool development?
- Design rules, verification of design?

Program Structure [Continuity]
- Multiple tracks (course sequences)
- Focus on projects/tools/etc.

Program Content [detailed discussion later]
- Re-target existing classes
- Introduce new classes
Example Program #1

**Focus:** Internships & industry applications

**Structure:** Tracks, tied to internship area
(e.g., embedded systems, communications, computer architecture, real-time firmware, software systems, etc.)

**Content:** Existing curriculum, making much existing material optional, plus additional classes for embedded system development, VLSI design, applications engineering, etc.
Example Program #2

**Focus:** Undergraduate research

**Structure:** Tools-based continuity
(e.g., Freshman Year: Use tools to build stuff, Sophomore Year: Discuss issues rel. to CAD, Junior Year: Develop rudimentary CAD tools, Senior Year: Deeper theory, refine Jr.Yr. tools)

**Content:** Existing curriculum, plus courses to support proposed Structure, minus equivalent number of credits [which?]
Example Program #3

**Focus:** *Industry partnerships*
(e.g., course development and/or teaching, guest lectures, project definition/target, competition judges, etc.)

**Structure:** *Projects-based continuity*
(e.g., Freshman Year: C-language RISC, Sophomore Year: Gate-level RISC, Junior Year: Verilog RISC + OS, Senior Year: ASIC (or FPGA) implementation)

**Content:** Brand-new curriculum, tweaked to overlap existing courses wherever possible
[ discuss & vote — focus/structure ]
Content: [Tracks?]

Opinion on “required” list in doc? Other tracks:

Embedded systems (HW/SW)
Communications systems (HW/SW)
Computer architecture & systems (HW/SW)
Digital chip & systems design (HW)
Real-time firmware & systems (SW)
Software systems (SW)

Additions/deletions?
Most importantly: TOPICS in EACH TRACK
# Content: Scope of Change

## Freshman Year
- CHEM 135  General Chemistry
- PHYS 161  General Physics
- MATH 140, 141  Calculus I, II
- CMSC 131  Object Oriented Programming I (Java) *(prereq for 132, may place out)*
- CMSC 132  Object Oriented Programming II (Java)
- ENES 100  Intro. to Engineering Design

## Sophomore Year
- ENEE 204  Circuit Theory
- ENEE 206  Lab for 204
- ENEE 241  Numerical Techniques
- ENEE 244  Digital Logic Design
- MATH 246  Differential Equations
- CMSC 212  Intro to Low-Level Prog. Concepts (C)
- CMSC 250  Discrete Structures (proofs)
- CMSC 351  Algorithms
- PHYS 260/261  General Physics

## Junior Year
- ENEE 303  Analog and Digital Electronics
- ENEE 307  Lab for 303
- ENEE 322  Signals & Systems
- ENEE 324  Engineering Probability
- ENEE 350  Computer Organization
- CMSC 330  Organization of Programming Languages (functional languages)

## Senior Year
- Technical Electives (22 credits)
- ENEE 446  Computer Architecture
- CMSC 412  Operating Systems
Content: Minor Tweak

Freshman Year

CHEM 135 General Chemistry
PHYS 161 General Physics
MATH 140, 141 Calculus I, II
CMSC 131 Object Oriented Programming I (Java) *(prereq for 132, may place out)*
CMSC 132 Object Oriented Programming II (Java)
ENES 100 Intro. to Engineering Design

Sophomore Year

ENEE 204 Circuit Theory
ENEE 206 Lab for 204
ENEE 241 Numerical Techniques
ENEE 244 Digital Logic Design
MATH 246 Differential Equations
CMSC 212 Intro to Low-Level Prog. Concepts (C)
CMSC 250 Discrete Structures (proofs)
CMSC 351 Algorithms
PHYS 260/261 General Physics

Junior Year

ENEE 303 Analog and Digital Electronics
ENEE 307 Lab for 303
ENEE 322 Signals & Systems
ENEE 324 Engineering Probability
ENEE 350 Computer Organization
CMSC 330 Organization of Programming Languages (functional languages)

Senior Year

Technical Electives (22 credits)
ENEE 446 Computer Architecture
CMSC 412 Operating Systems
## Content: Blue Sky

### Freshman Year (plus physics & calculus i+ii)

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>114</td>
<td>Programming Concepts for Engineers I</td>
</tr>
<tr>
<td>115</td>
<td>Programming Concepts for Engineers II</td>
</tr>
<tr>
<td>244</td>
<td>Logic Design</td>
</tr>
<tr>
<td>enes100</td>
<td>Intro. to Engineering Design</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>204</td>
<td>Circuit Theory (e.g., Agarwal &amp; Lang)</td>
</tr>
<tr>
<td>206</td>
<td>Lab for 204</td>
</tr>
<tr>
<td>350</td>
<td>Computer Organization I — instruction sets, pipelines, caches</td>
</tr>
<tr>
<td>359a</td>
<td>Digital VLSI Design (e.g., Weste &amp; Harris or Rabaey)</td>
</tr>
<tr>
<td>new</td>
<td>FPGA Lab: Verilog Design &amp; VLSI Synthesis (e.g., Smith &amp; Franzon)</td>
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<tr>
<td>new</td>
<td>Applications Engineering (data structures, sophisticated problem solving)</td>
</tr>
<tr>
<td>ma???</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>ma246</td>
<td>Differential Equations</td>
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### Junior Year

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<tr>
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<tbody>
<tr>
<td>303</td>
<td>Analog Circuits (e.g. Sedra &amp; Smith)</td>
</tr>
<tr>
<td>3xx</td>
<td>Lab for 303</td>
</tr>
<tr>
<td>447</td>
<td>Real-Time Operating Systems &amp; Applications (e.g., Liu)</td>
</tr>
<tr>
<td>new</td>
<td>Digital Systems Design (e.g., Dally &amp; Poulton)</td>
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<tr>
<td>???</td>
<td>Control Theory</td>
</tr>
<tr>
<td>new? opt?</td>
<td>Compilers</td>
</tr>
<tr>
<td>opt</td>
<td>Computer Organization II — system software (e.g., Bryant &amp; O’Halleron)</td>
</tr>
<tr>
<td>380/1, opt</td>
<td>Electromagnetics</td>
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### Senior Year

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>???</td>
<td>DSP Programming</td>
</tr>
<tr>
<td>cs412</td>
<td>Operating Systems <em>(taught by CS)</em> (perhaps obviated by 447?)</td>
</tr>
<tr>
<td></td>
<td>Various Senior-Level Capstone Design Options</td>
</tr>
<tr>
<td>646, opt</td>
<td>Architecture: Officially endorse in senior year for interested students</td>
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