Executive Summary

• **Curriculum: More choices, faster finish**
  – Engineering electives increase from 6 to 8
  – Choice of two specializations not one
  – Non-EE technical courses part of specialization
  – Total hours reduced from 128 to 123
  – 4-year degree: transfer students can finish in 2 years
  – 56 course abstracts changed

• **Process: Multiple sources, documented**
  – Input from faculty, staff, students, visiting committee
  – Approved by ECE faculty on Feb. 9, 2001
  – Satisfies ABET requirements
  – Documented at http://www.ece.utexas.edu/~bevans/eereform
Dressed for Success *Tomorrow*

- **Mastery of “hard” skills**
  - Fundamentals of mathematics, physics, *biology*
  - Theory and practice of electromagnetics, devices, circuits, systems, software, *networking*
  - *Design principles, abstraction, and complexity*

- **Mastery of “soft” skills**
  - Oral and written engineering communication
  - Business practice of *marketing, budgeting, product development, and ethics*
2000-2002 BSEE Core Courses

Electromag. and Devices (3 courses)
- PHY 303L
- EE 325
- EE 339

Circuits (6 courses)
- EE 302
- EE 411
- EE 321
- EE 338
- EE 338K

Systems (3 courses)
- EE 313
- EE 338K
- EE 339

Digital Hardware (2 courses)
- EE 316
- EE 319K

Software (1 course)
- EE 312

Engineering Comm. (3 courses)
- EE 155
- EE 333T
- EE 464H/K

- Shading: lab course
- Black lines: co-requisites
- Adv. Lab: EE 321K, 345M, or 345S
## 2000-2002 BSEE Curriculum

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage</th>
<th>Credit Hours</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>analog circuits/systems</td>
<td>40%</td>
<td>24.5</td>
<td>2/3 EE302 + 2/3 EE313 + EE411 + 1/2 EE321 + EE321K + EE338 + EE338K + EE351K + EE362K</td>
</tr>
<tr>
<td>specialization</td>
<td>18%</td>
<td>11.0</td>
<td>1/2 EE464H/K + 3 tech. area electives</td>
</tr>
<tr>
<td>analog devices/electromagnetics</td>
<td>10%</td>
<td>6.0</td>
<td>EE325 + EE339</td>
</tr>
<tr>
<td>engineering communication</td>
<td>9%</td>
<td>5.6</td>
<td>EE155 + EE333T + 4/10 EE464H/K</td>
</tr>
<tr>
<td>digital logic/microprocessors</td>
<td>8%</td>
<td>5.0</td>
<td>1/6 EE302 + EE316 + 1/2 EE319K</td>
</tr>
<tr>
<td>programming</td>
<td>8%</td>
<td>4.5</td>
<td>EE312 + 1/2 EE319K</td>
</tr>
<tr>
<td>discrete-time processing/data acquisition</td>
<td>4%</td>
<td>2.5</td>
<td>1/3 EE313 + 1/2 EE321</td>
</tr>
<tr>
<td>business practice</td>
<td>2%</td>
<td>0.9</td>
<td>1/6 EE302 (ethics) + 1/10 EE464H/K (ethics)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>60.0</td>
<td></td>
</tr>
</tbody>
</table>

Required EE courses: 51 hours  
Technical area electives: 9 hours  
Hard skills: 53.3 hours  
Soft skills: 6.7 hours
2002-2004 BSEE Core Courses

**Electromag. and Devices**
- (3 courses)

**Circuits**
- (3 courses)

**Systems**
- (3 courses)

**Digital Hardware**
- (3 courses)

**Software**
- (2 courses)

**Engineering Comm.**
- (3 courses)

- **PHY 303L**
  - EE 302
  - EE 411
  - EE 325
  - EE 438
  - EE 339

- **EE 322**
  - EE 306
  - EE 316
  - EE 319K
  - EE 312
  - EE 322
  - EE 155
  - EE 333T

- **EE 302**
- **EE 411**
- **EE 313**
- **EE 316**
- **EE 319K**
- **EE 322**
- **EE 366**

- **EE 438**
- **EE 362K**
- **EE 351K**
- **EE 366**

- **EE 339**
- **EE 351K**
- **EE 366**

- **Adv. Lab**

- **EE 464H/K**

**Notes:**
- Shading: lab course
- Black lines: co-requisites
- Dashed lines: “or” prereq
- Comp. Eng.: EE345L instead of EE362K
### 2002-2004 BSEE Curriculum

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage</th>
<th>Credit Hours</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>specialization</td>
<td>28.6%</td>
<td>20.0</td>
<td>Advanced Lab + 1/2 EE464H/K + 5 technical area electives</td>
</tr>
<tr>
<td>analog circuits/systems</td>
<td>24.3%</td>
<td>17.0</td>
<td>2/3 EE302 + 2/3 EE313 + EE411 + 3/4 EE438 + EE351K + EE362K</td>
</tr>
<tr>
<td>digital logic/microprocessors</td>
<td>12.8%</td>
<td>9.0</td>
<td>EE306 + EE316 + EE319K</td>
</tr>
<tr>
<td>programming</td>
<td>8.6%</td>
<td>6.0</td>
<td>EE312 + EE322</td>
</tr>
<tr>
<td>analog devices/electromagnetics</td>
<td>8.6%</td>
<td>6.0</td>
<td>EE325 + EE339</td>
</tr>
<tr>
<td>engineering communication</td>
<td>8.0%</td>
<td>5.6</td>
<td>EE155 + EE333T + 4/10 EE464H/K</td>
</tr>
<tr>
<td>business practice</td>
<td>5.6%</td>
<td>3.9</td>
<td>1/6 EE302 (ethics) + 1/10 EE464H/K (ethics) + EE366 (economics)</td>
</tr>
<tr>
<td>discrete-time processing/data acquisition</td>
<td>3.5%</td>
<td>2.5</td>
<td>1/6 EE302 + 1/3 EE313 + 1/4 EE438</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>70.0</td>
<td></td>
</tr>
</tbody>
</table>

**Required EE courses:** 52 hours  
**Technical area electives:** 18 hours  
**Hard skills:** 60.5 hours  
**Soft skills:** 9.5 hours
## 2000-02 vs. 2002-04 Curriculum

<table>
<thead>
<tr>
<th>Topic</th>
<th>2000-2002 Credit Hours</th>
<th>2002-2004 Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>specialization</td>
<td>11.0</td>
<td>20.0</td>
</tr>
<tr>
<td>analog circuits/systems</td>
<td>24.5</td>
<td>17.0</td>
</tr>
<tr>
<td>digital logic/microprocessors</td>
<td>5.6</td>
<td>9.0</td>
</tr>
<tr>
<td>programming</td>
<td>4.5</td>
<td>6.0</td>
</tr>
<tr>
<td>analog devices/electromagnetics</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>engineering communication</td>
<td>5.6</td>
<td>5.6</td>
</tr>
<tr>
<td>business practice</td>
<td>0.9</td>
<td>3.9</td>
</tr>
<tr>
<td>discrete-time processing/data acquisition</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60.0</strong></td>
<td><strong>70.0</strong></td>
</tr>
</tbody>
</table>

Changes are shown in yellow

Engineering Courses
More Choices, Faster Access

• **Students choose two technical areas**
  – BSEE students could only choose one before
  – BS Comp. Eng. students had no choice before
  – One technical elective supports technical areas

• **More choices of technical areas**
  – 15 technical areas instead of 9
  – Each technical area has 4-8 courses
  – First semester juniors can access technical area
Tech Areas: EE Emphasis, Part 1

- **Unchanged technical areas**
  - Electromagnetic Engineering
  - Management and Production
  - Power Systems and Energy Conversion

- **New Electronics technical area**
  - Eight courses
  - Includes EE321, EE321K, and EE338K
  - Allows smooth transition from previous catalogs
<table>
<thead>
<tr>
<th>Tech Areas: EE Emphasis, Part 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2000-2002</strong></td>
</tr>
<tr>
<td>Biomedical Eng. / Premedical</td>
</tr>
<tr>
<td>Electronic Devices, Materials, and Int. Electronics</td>
</tr>
<tr>
<td>Telecomm./Signal Processing</td>
</tr>
<tr>
<td><strong>2002-2004</strong></td>
</tr>
<tr>
<td>Biomedical Eng.</td>
</tr>
<tr>
<td>Premedical</td>
</tr>
<tr>
<td>Robotics/Controls</td>
</tr>
<tr>
<td>Electronic Materials/Devices</td>
</tr>
<tr>
<td>Comm./Networking</td>
</tr>
<tr>
<td>Signal and Image Processing</td>
</tr>
</tbody>
</table>
Tech Areas: CompEng Emphasis

2000-2002
Computer Engineering
Software Engineering

2002-2004
Computer Design
Embedded Systems
VLSI Design
Software Development
System Software
Faster Finish

• Total number of hours reduced by five to 123 hours
  – Four years to complete 123 hours
  – Transfer students could finish in two years if they have completed two years elsewhere

• Transfer students in 1999-2000
  – 18.9% of new ECE students in 1999-2000
  – 11 fresh., 39 soph., 24 juniors, 12 seniors
Changes for Both Degrees

- Three required courses added
  - EE306 Introduction to Computing
  - EE322 Data Structures
  - EE366 Engineering Economics I
- CH301 Chemistry not required but proficiency in chemistry is required
- Four courses become tech area electives
  - Electronics: EE321, EE321K, and EE338K
  - Physics 355 Modern Physics
- Changes to 56 course abstracts
Other Changes for Comp. Eng.

• Fourth newly required course
  – EE345L Microprocessor Interfacing Lab.

• Three other courses become technical area electives and their content changes
  – EE360C Algorithms
  – EE360N Computer Architecture
  – EE360P Concurrent and Distributed Systems
Appendix

Motivations to Pursue BSEE

- **Early 1980s:** home computers, MTV, voiceband data modems, bulletin boards
- **Late 1980s:** PCs, analog cell phones, audio CD players, bulletin boards
- **Early 1990s:** laptops, digital cell phones, video CDs, Internet browsing
- **Late 1990s:** palm pilots, Internet cell phones, DVDs, MP3 players, ADSL
Appendix

Trends in Consumer Electronics

- Increasing amount of communications, signal processing, networking capabilities
- Increasingly digital: software larger role
- Analog, RF, optical subsystems needed to interface systems to physical world
- Devices & semiconductor manufacturing
  - Shrinking area, volume & power consumption
  - Exponential increase in processor speeds
## BSEE Technical Area Choices

<table>
<thead>
<tr>
<th>Technical Area</th>
<th>Students</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Engineering</td>
<td>230</td>
<td>37%</td>
</tr>
<tr>
<td>Telecommunications and Signal Proc.</td>
<td>99</td>
<td>16%</td>
</tr>
<tr>
<td>Management and Production</td>
<td>66</td>
<td>11%</td>
</tr>
<tr>
<td>Integrated Electronics</td>
<td>62</td>
<td>10%</td>
</tr>
<tr>
<td>Electronic Materials and Devices</td>
<td>28</td>
<td>5%</td>
</tr>
<tr>
<td>Electromagnetic Engineering</td>
<td>25</td>
<td>4%</td>
</tr>
<tr>
<td>Premed/Biomedical</td>
<td>25</td>
<td>4%</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>23</td>
<td>4%</td>
</tr>
<tr>
<td>Communication and Control</td>
<td>21</td>
<td>3%</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>21</td>
<td>3%</td>
</tr>
<tr>
<td>Information Systems Engineering</td>
<td>12</td>
<td>2%</td>
</tr>
<tr>
<td>Power Systems and Energy</td>
<td>9</td>
<td>1%</td>
</tr>
</tbody>
</table>

Fall 1999 data for 621 BSEE students who declared.

Not included: 306 Comp. Eng. and 785 Undecided majors.
Appendix

Digital Hardware Courses

• **EE306 Introduction to Computing**
  – Bottom-up treatment of computer architecture from gates to assembly language including digital logic analysis and finite state machines
  – Overlap with EE302, EE316, and EE319K which frees these courses to teach other topics

• **EE319K Intro. to Microcontrollers**
  – Move 50-75% of EE345L to EE319K
  – Move 50-75% of EE345M into EE345L
  – EE345M becomes a real-time OS course
Appendix

Digital Hardware Courses

• **EE316 Digital Logic Design**
  - Current topics: Boolean algebra; analysis and synthesis of combinational and sequential digital logic; applications to computer design
  - New pre-requisite of EE 306 [or CS310] which covers analysis of digital logic and finite state machines
  - New topics: VHDL, synthesis onto FPGAs
  - Remains required for both degrees
## Circuits and Systems Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Remove</th>
<th>Add</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE302</td>
<td>Dynamic circuit analysis</td>
<td>Signal/system representation</td>
</tr>
<tr>
<td></td>
<td>Digital system design</td>
<td>Finite state machines</td>
</tr>
<tr>
<td>EE411</td>
<td>Two-port networks</td>
<td>Operational amplifiers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bode plots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three-phase circuits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Laplace transforms</td>
</tr>
<tr>
<td>EE313</td>
<td>Signal/system representation</td>
<td>Review sig/sys representation</td>
</tr>
<tr>
<td></td>
<td>Quantization</td>
<td>AM/FM modulation</td>
</tr>
<tr>
<td>EE338</td>
<td></td>
<td>Two-port networks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab component (EE438)</td>
</tr>
<tr>
<td>EE351K</td>
<td></td>
<td>Markov chains</td>
</tr>
</tbody>
</table>

Add one-hour lab component to EE338 to form EE438
No proposed changes to EE362K
Appendix

Labs in EE438 Electronic Circuits

• **Generation & acquisition of test signals**
  – Sinusoids and noise

• **Measure current, voltage, impedance**
  – 2/3-terminal devices; analyze mystery circuit

• **Complex transfer function measurement**
  – Transfer function, magnitude/phase response to sinusoid/noise input, Bode plot/breakpoints

• **Spectrum measurements and analysis**
Appendix

Advanced Laboratory Course

• Prepare a student for Senior Design
  – EE321 Electrical Engineering Lab I
  – EE440 Microelectronics Fabrication Tech.
  – EE345L Microprocessor Interfacing Lab
  – EE345S Real-Time Digital Sig. Proc. Lab OR
  – EE374L Applications of Biomedical Eng.

• Leverage student’s technical area
  – Counted as technical area elective for BSEE
  – EE345L required for BS Comp. Eng. degree
### ABET: Math/Science Courses

<table>
<thead>
<tr>
<th>EE</th>
<th>Hours/Math</th>
<th>Hours/Phy</th>
<th>Hours/EE</th>
</tr>
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<tbody>
<tr>
<td>306</td>
<td>1 (discrete)</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>313</td>
<td>2 (transforms)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>316</td>
<td>1 (discrete)</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>325</td>
<td>1 (pde&amp;vector)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>351K</td>
<td>2 (prob./stat.)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>366</td>
<td>1 (prob.)</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

- **8 hours**
- **1 hour**
- **9 hours**

15 math hours + 8 physics hours + 8 math hours from EE + 1 physics hour from EE = 32 hours
Appendix

ABET: Engineering Topics

- **52 semester hours of core EE courses**
- **Each student picks two technical areas**
  - Every EE technical area requires taking at least two engineering courses (6 hours)
  - Software Development can be satisfied with math and computer science courses
  - Software Engineering can be satisfied with one engineering course
- **Worst case (52 + 3 – 9 = 46 hours) meets requirement of 3/8 of total of 123 hours**