



# **BSEE and BS Comp. Eng. Curriculum for the 2002-2004 Catalog**



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**<http://www.ece.utexas.edu/~bevans/eereform/>**

# 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)

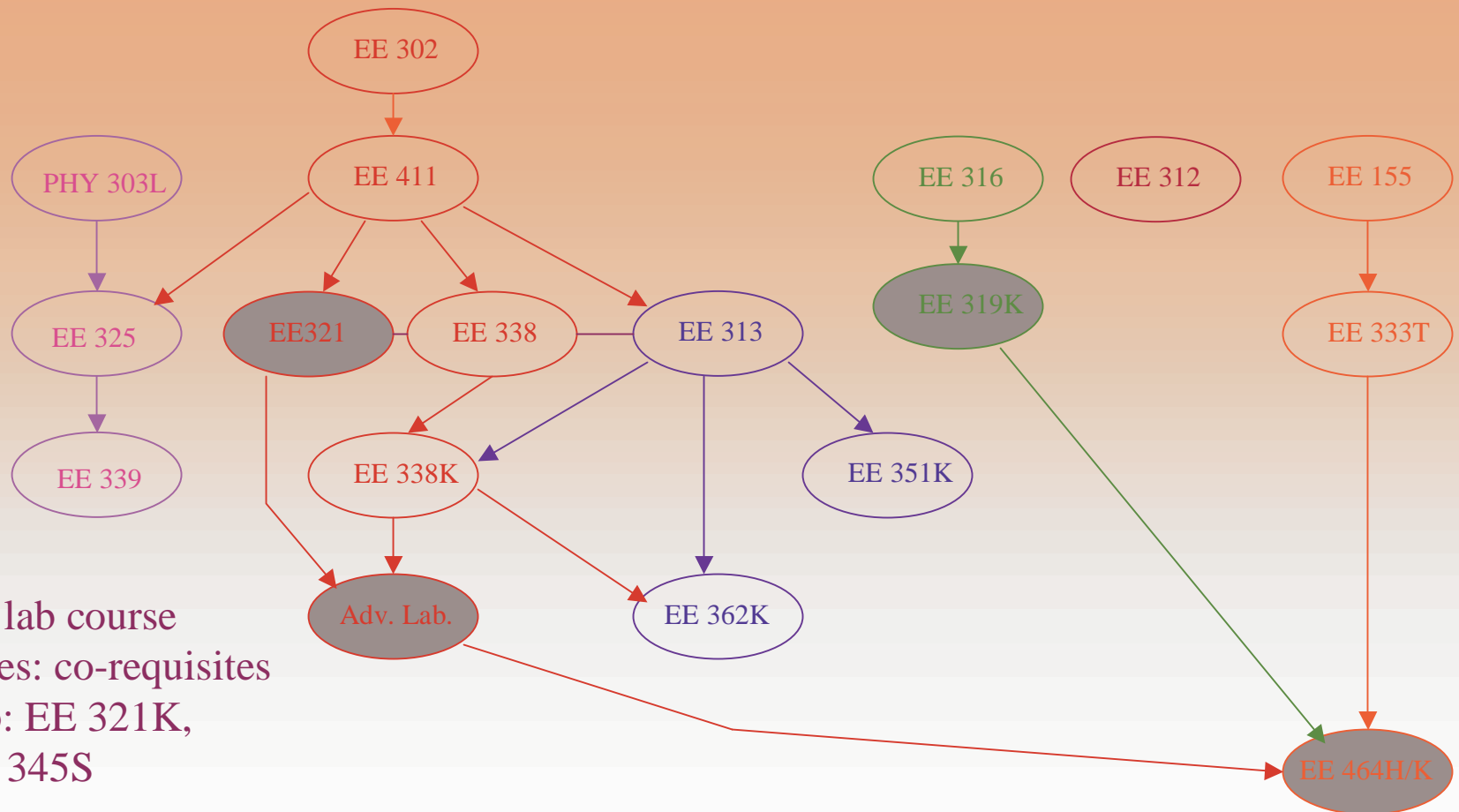
Circuits  
(6 courses)

Systems  
(3 courses)

Digital  
Hardware  
(2 courses)

Software  
(1 course)

Engineering  
Comm.  
(3 courses)



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

# 2000-2002 BSEE Curriculum

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

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)

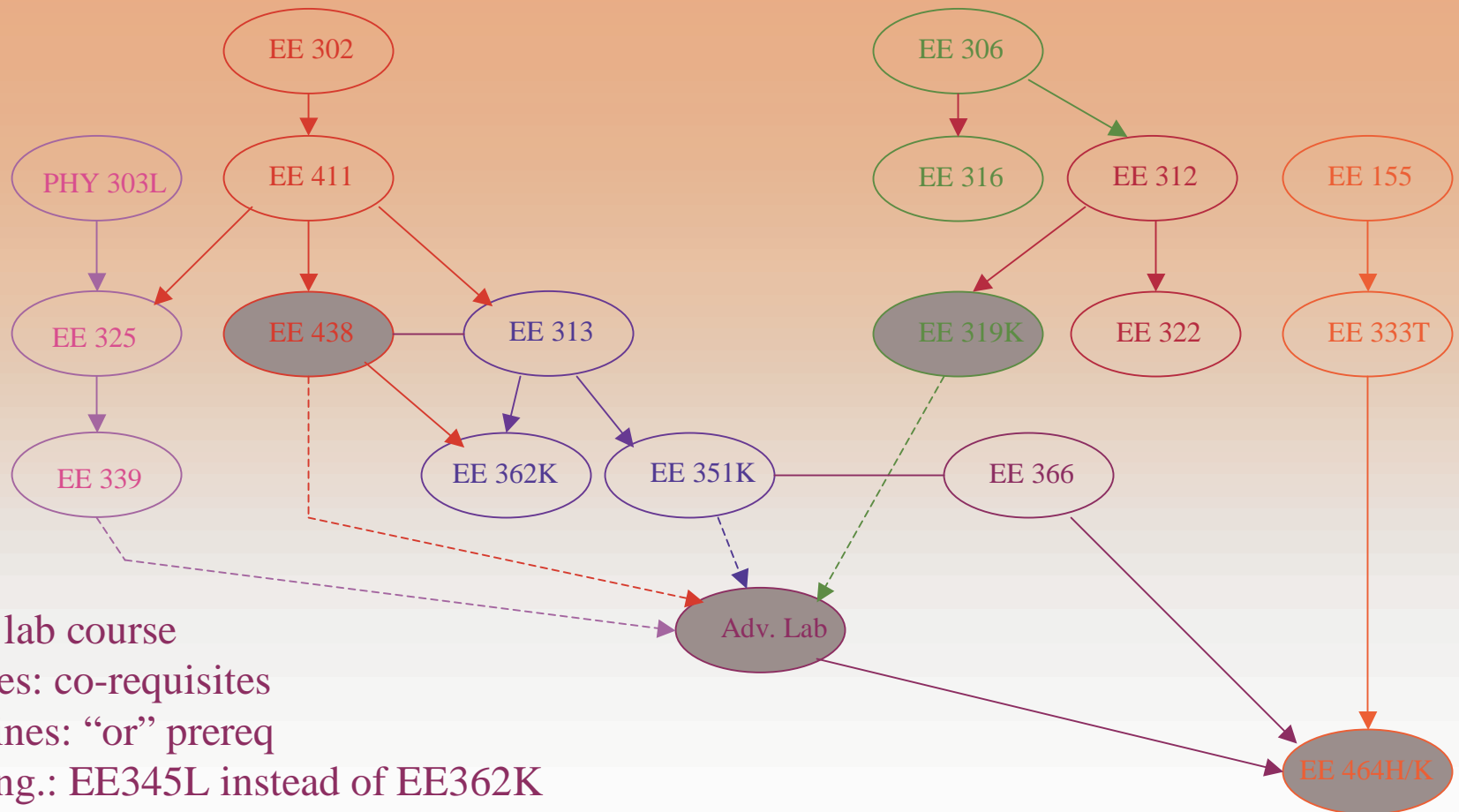
Circuits  
(3 courses)

Systems  
(3 courses)

Digital  
Hardware  
(3 courses)

Software  
(2 courses)

Engineering  
Comm.  
(3 courses)



- Shading: lab course
- Black lines: co-requisites
- Dashed lines: “or” prereq
- Comp. Eng.: EE345L instead of EE362K

# 2002-2004 BSEE Curriculum

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

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

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

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

# Tech Areas: EE Emphasis, Part 2

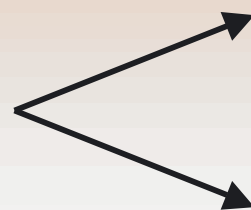
2000-2002

**Biomedical Eng. /  
Premedical**

**Info. Sys. Eng.**

**Electronic Devices,  
Materials, and  
Int. Electronics**

**Telecomm./Signal  
Processing**



2002-2004

**Biomedical Eng.  
Premedical**

**Robotics/Controls**

**Electronic  
Materials/Devices**

**Comm./Networking  
Signal and Image  
Processing**

# Tech Areas: CompEng Emphasis

2000-2002

**Computer  
Engineering**



2002-2004

**Software  
Engineering**



# 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

## Appendix

# BSEE Technical Area Choices

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

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

## Appendix

# Circuits and Systems Courses

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

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

## Appendix

# ABET: Math/Science Courses

EE	Hours/Math	Hours/Phy	Hours/EE
306	1 (discrete)	-	2
313	2 (transforms)	-	1
316	1 (discrete)	-	2
325	1 (pde&vector)	1	1
351K	2 (prob./stat.)	-	1
366	1 (prob.)	-	2
	<b>8 hours</b>	<b>1 hour</b>	<b>9 hours</b>

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**