Department of

Computer Science & Electrical Engineering

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http://www.byui.edu/CSEE/

Department of Computer Science and Electrical Engineering

The curricula in the Department of Computer Science and Electrical Engineering are designed to provide a broad background in the theory and practice of computer software, computer hardware, and electrical systems. Students learn how to combine scientific knowledge and engineering methods with practical technical skills to help prepare them for life-long learning and rewarding employment. Three degree programs are offered:

1) B.S. in Computer Science

2) B.S. in Computer Engineering

3) B.S. in Electrical Engineering

Graduates in the Department of Computer Science and Electrical Engineering will:

- Have a thorough grounding in the fundamental principles and practices of their respective degree programs
- Have learned how to learn
- Be prepared for a successful career
- Be ethical and responsible employees who make a difference

The Department of Computer Science and Electrical Engineering continually strives to evaluate, improve, and modernize its curricula to keep pace with today's technological innovations. Advisors can help students determine the best sequence of courses to meet all graduation requirements within eight semesters. To qualify for graduation, students must achieve at least a C- grade in all major required classes.

Computer Science

As a computer scientist, imagine creating the next search engine, the next social web site, or even the next "must have" video game. The Computer Science program at BYU-Idaho offers a solid background in computer science by providing experiences in algorithm development, procedural and object-oriented design and programming, software engineering practices, computer security, web engineering, technical communication, and theoretical foundations of computing. Graduates are prepared for high paying employment as software engineers or to continue their education at graduate school.

Computer Engineering

As a computer engineer, imagine creating the next super computer, the next revolutionary MP3/video player, or even the next control system for the latest Air Force fighter jet. The Computer Engineering program at BYU-Idaho balances scientific and engineering theory with technical laboratory experiences in order to develop practical knowledge and skills that working computer engineers need. The curriculum is balanced to make you adept at designing and developing both computer hardware and computer software. In addition, throughout your computer engineering education, you will gain in-depth knowledge and skills in the design and development of many different types of computer systems: from small MP3 players to large parallel computer systems. Graduates are prepared for high paying employment as computer engineers or to continue their education at graduate school.

The Program Educational Objectives for the Computer Engineering program are that graduates of this program will:

1. Be disciple leaders with a strong testimony
2. Maintain a broad and rigorous understanding of the fundamentals of computer engineering
3. Possess well developed design and problem solving skills
4. Continually develop and learn
5. Possess strong communication and interpersonal skills
6. Make a positive difference in their family, their workplace, and their community

Electrical Engineering

As an electrical engineer, imagine creating the next generation of consumer electronic devices, the next generation of robotics, or the next electronic medical device that saves lives. The Electrical Engineering program at BYU-Idaho prepares you to use electricity and electronics in novel ways to help solve some of the world's greatest scientific challenges. The program balances scientific and engineering theory with technical laboratory experiences in order to develop practical knowledge and skills that working electrical engineers need. Graduates are prepared for high paying employment as electrical engineers or to continue their education at graduate school.

The Program Educational Objectives for the Electrical Engineering program are that graduates of this program will:

1. Be disciple leaders with a strong testimony
2. Maintain a broad and rigorous understanding of the fundamentals of electrical engineering
3. Possess well developed design and problem solving skills
4. Continually develop and learn
5. Possess strong communication and interpersonal skills
6. Make a positive difference in their family, their workplace, and their community

BS in Computer Science (440)

Take required Foundations courses

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

Core Courses

Take these courses during your first 3 semesters:

CS 124	3
CS 165	3
CS 235	3
ECEN 160	3
	12

Take these courses:

CS 213	3
CS 237	3
CS 238	3
CS 246	3
CS 306	3
CS 308	3
CS 345	3
CS 364	4
CS 416	2
CS 432	3
CS 470	3
ECEN 324	3
MATH 330	3
MATH 341	3
	42

Supplemental Courses

Take 12 credits:

CIT 225	3
CS 312	3
CS 313	3
CS 371	3
CS 460	3
CS 480	3
CS 490R	3
ECEN 460	3
	12

Take 1 course:

CS 398	1-4
CS 498R	1-4
	1

Take 3 credits:

CS 499	3
or	
CS 499A	2
CS 499B	1
	3

Math and Science Courses

Take 1 course:

BIO 240	4
CHEM 106	4
MATH 113	3
MATH 411	3
PH 220	3
	3

Science Courses

Take this course:

CHEM 105	4
	4

OR

Take these courses:

PH 121	3
PH 150	1
	4

Program Notes:

Total Major Credits=77

Additional Elective Credits Required for Graduation=3

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

BS in Electrical Engineering (445)

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

Core Courses
Take these courses during your first 2 semesters:

CS 124	3
CS 165	3
ECEN 150	3
ECEN 160	3
	12

Take these courses:

CHEM 105	4
CS 235	3
CS 237	3
CS 308	3
ECEN 250	4
ECEN 260	3
ECEN 340	3
ECEN 350	3
ECEN 380	3
ECEN 390	3
ECEN 398R	1-7
ECEN 499	3
MATH 215	4
MATH 316	4
MATH 330	3
PH 220	3
	50

Math and Science Courses
Take 1 course:

BIO 221	3
BIO 240	4
BIO 264 & 264L	4
CHEM 106	4
CHEM 351	4
CS 238	3
MATH 341	3
MATH 411	3
MATH 423	3
PH 123	3
PH 127	3
	3

Take 1 course:

ECEN 440	3
ECEN 470	3
ECEN 480	3
	3

Supplemental Courses
Take 4 courses:

ECEN 324	3
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 460	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
ME 310	2
	11

Program Notes:

Total Major Credits=79
Additional Elective Credits Required for Graduation=1

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Foundation Requirements for BS in Electrical Engineering

Major Requirements

Students must maintain a minimum grade of C- in their major courses

Academic Fundamentals

Quantitative Reasoning
Take these courses:

FDMAT 112	4
FDMAT 108T	1
	5

Reading and Writing
Take these courses:

FDENG 101	3
FDENG 201	3
	6

Science

Science Foundations
Take this course:

FDSCI 101	2
	2

Science Issues
Take this course:

PH 121	3
	3

Cultural Awareness

American Foundations
Take this course:

FDAMF 101	3
	3

Humanities Foundations
Take this course:

FDCA 101	3
	3

AND
International Foundations
Take 1 course:

FDCA 201	2
FDCA 202	2
FDCA 203	2
FDCA 204	2
FDCA 205	2
FDCA 206	2
	2

OR
World Foundations
Take these courses:

FDWLD 101	2
FDWLD 201	3
	5

Connections
Take this course:

FDCNC 350	2
	2

Eternal Truths

Family Foundations
Take this course:

FDREL 200	2
	2

Book of Mormon
Take these courses:

FDREL 122	2
FDREL 121	2
	4

Scripture Based Courses
Take 4 credits:

FDREL 211	2
FDREL 212	2
FDREL 301	2
FDREL 302	2
FDREL 324	2
FDREL 325	2
	4

Other Religion Courses
Take 4 credits:

FDREL 100	2
FDREL 130	2
FDREL 150	2
FDREL 215	2
FDREL 234	2
FDREL 235	2
FDREL 261	2
FDREL 264	2
FDREL 333	2
FDREL 341	2
FDREL 342	3
FDREL 343	3
FDREL 351	2
FDREL 352	2
FDREL 370	2
FDREL 431	2
FDREL 471	2
FDREL 475	2
	4

Total Foundation Credits for Mechanical Engineering=40

BS in Computer Engineering (450)

Major Requirements

No Double Counting of Major Courses - No Grade Less Than C- in Major Courses

Core Courses

Take these courses during your first 2 semesters:

CS 124	3
CS 165	3
ECEN 150	3
ECEN 160	3
	12

Take these courses:

CHEM 105	4
CS 235	3
CS 237	3
CS 308	3
ECEN 250	4
ECEN 260	3
ECEN 324	3
ECEN 340	3
ECEN 350	3
ECEN 390	3
ECEN 398R	1-7
ECEN 460	3
ECEN 499	3
MATH 215	4
MATH 316	4
MATH 330	3
PH 220	3
	53

Take 1 course:

ECEN 440	3
ECEN 450	3
ECEN 480	3
	3

Take 2 courses:

ECEN 380	3
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
	6

Math and Science Courses

Take 1 course:

BIO 221	3
BIO 240	4
BIO 264 & 264L	4
CHEM 106	4
CHEM 351	4
CS 238	3
MATH 341	3
MATH 411	3
MATH 423	3
PH 123	3
PH 127	3
	3

Supplemental Core Courses

Take 1 courses:

ECEN 380	3
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
CS 246	3
CS 313	3
CS 345	3
CS 364	4
CS 371	3
CS 416	2
CS 432	3
CS 460	3
CS 470	3
CS 480	3
CS 490R	3
	2

Program Notes:

Total Major Credits=79

Additional Elective Credits Required for Graduation=1

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Foundation Requirements for BS in Computer Engineering

Major Requirements

Students must maintain a minimum grade of C- in their major courses

Academic Fundamentals

Quantitative Reasoning

Take these courses:

FDMAT 112	4
FDMAT 108T	1
	5

Reading and Writing

Take these courses:

FDENG 101	3
FDENG 201	3
	6

Science

Science Foundations

Take this course:

FDSCI 101	2
	2

Science Issues

Take this course:

PH 121	3
	3

Cultural Awareness

American Foundations

Take this course:

FDAMF 101	3
	3

Humanities Foundations

Take this course:

FDCA 101	3
	3

International Foundations

Take 1 course:

FDCA 201	2
FDCA 202	2
FDCA 203	2
FDCA 204	2
FDCA 205	2
FDCA 206	2
	2

Connections

Take this course:

FDCNC 350	2
	2

Eternal Truths

Family Foundations

Take this course:

FDREL 200	2
	2

Book of Mormon

Take these courses:

FDREL 122	2
FDREL 121	2
	4

Scripture Based Courses

Take 4 credits:

FDREL 211	2
FDREL 212	2
FDREL 301	2
FDREL 302	2
FDREL 324	2
FDREL 325	2
	4

Other Religion Courses

Take 4 credits:

FDREL 100	2
FDREL 130	2
FDREL 150	2
FDREL 215	2
FDREL 234	2
FDREL 235	2
FDREL 261	2
FDREL 264	2
FDREL 333	2
FDREL 341	2
FDREL 342	3
FDREL 343	3
FDREL 351	2
FDREL 352	2
FDREL 370	2
FDREL 431	2
FDREL 471	2
FDREL 475	2
	4

Total Foundation Credits for Mechanical Engineering=40

Minor in Computer Science (147)

Minor Requirements

Core Courses
Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 246	3
	12

Optional Courses
Take 12 credits:

ECEN 160	3
ECEN 324	3
CS 213	3
CS 237	3
CS 238	3
CS 306	3
CS 312	3
CS 313	3
CS 345	3
CS 364	4
CS 371	3
CS 416	2
CS 432	3
CS 460	3
CS 470	3
CS 480	3
CS 490R	3
	12

Program Notes:
No double counting of minor courses

Total Minor Credits=24

This minor is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Software Engineering Concentration (D 106)

Concentration Requirements

No Double Counting of Concentration Courses

Introductory Module
Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 246	3
IDS 398R	1-3
IDS 499	2
	15

Software Engineering-Module
Take these courses:

CS 308	3
CS 364	4
CS 371	3
CS 416	2
CS 432	3
	15

Supplemental Courses
Take 6 credits of upper division courses not included in concentration core or selected emphasis area:

CS 306	3
CS 312	3
CS 313	3
CS 345	3
CS 398	1-4
CS 460	3
CS 470	3
CS 480	3
CS 490R	3
CS 498R	1-4
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ECEN 324	3
ECEN 340	3
ECEN 350	3
ECEN 380	3
ECEN 390	3
ECEN 398R	1-7
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 460	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
	6

Program Notes:

Total Concentration Credits=36

This Concentration is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Computer Science Internet Concentration (D 107)

Concentration Requirements

No Double Counting of Concentration Courses

Introductory Module
Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 246	3
IDS 398R	1-3
IDS 499	2
	15

Internet Module
Take these courses:

CS 213	3
CS 313	3
CS 460	3
CS 470	3
	12

Supplemental Courses
Take 9 credits of upper division courses not included in concentration core or selected emphasis area:

CS 306	3
CS 308	3
CS 312	3
CS 345	3
CS 364	4
CS 371	3
CS 398	1-4
CS 416	2
CS 432	3
CS 480	3
CS 490R	3
CS 498R	1-4

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ECEN 324	3
ECEN 340	3
ECEN 350	3
ECEN 380	3
ECEN 390	3
ECEN 398R	1-7
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 460	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
	9

Program Notes:

Total Concentration Credits=36

This Concentration is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Computer Science Hardware Concentration (D 108)

Concentration Requirements

No Double Counting of Concentration Courses

Introductory Module
Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 246	3
IDS 398R	1-3
IDS 499	2
	15

Hardware Interface Module
Take these courses:

CS 345	3
ECEN 160	3
ECEN 324	3
ECEN 460	3
	12

Supplemental Courses
Take 9 credits of upper division courses not included in concentration core or selected emphasis area:

CS 306	3
CS 308	3
CS 312	3
CS 313	3
CS 364	4
CS 371	3
CS 398	1-4
CS 416	2
CS 432	3
CS 460	3
CS 470	3
CS 480	3
CS 490R	3
CS 498R	1-4

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ECEN 340	3
ECEN 350	3
ECEN 380	3
ECEN 390	3
ECEN 398R	1-7
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
	9

Program Notes:

Total Concentration Credits=36

This Concentration is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Computer Science Theory Concentration (D 109)

Concentration Requirements

No Double Counting of Concentration Courses

Introductory Module
Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 246	3
IDS 398R	1-3
IDS 499	2
	15

Theory Module
Take these courses:

CS 237	3
CS 238	3
CS 306	3
CS 480	3
	12

Supplemental Courses
Take 9 credits of upper division courses not included in concentration core or selected emphasis area:

CS 308	3
CS 312	3
CS 313	3
CS 345	3
CS 364	4
CS 371	3
CS 398	1-4
CS 416	2
CS 432	3
CS 460	3
CS 470	3
CS 490R	3
CS 498R	1-4

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ECEN 324	3
ECEN 340	3
ECEN 350	3
ECEN 380	3
ECEN 390	3
ECEN 398R	1-7
ECEN 420	3
ECEN 430	3
ECEN 440	3
ECEN 450	3
ECEN 460	3
ECEN 470	3
ECEN 480	3
ECEN 490	3
	9

Program Notes:

Total Concentration Credits=36

This Concentration is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

AAS in Engineering (351)

Take required Foundations courses (17 credits)

Major Requirements

No Double Counting of Major Courses - Students must maintain a minimum grade of C- in their major courses

Core Courses
Take these courses:

CHEM 105	4
MATH 113	3
MATH 214	3
MATH 316	4
PH 220	3
	17

For Chemical Engineering and Civil Engineering options take 1 additional elective credit

Program Notes:

Select One Option

Chemical Engineering Option

Take these courses:

CHEM 106	4
CHEM 351	4
CHEM 352	4
ME 142	3
PH 121	3
	18

Take 6 credits:

CHEM 461	3
MATH 341	3
ME 201	2
ME 202	3
ME 330	3
PH 123	3
PH 220	3
	6

Civil Engineering Option

Take these courses:

CONST 340	3
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 204	3
ME 250	3
ME 250L	1
PH 123	3
	24

Electrical Engineering Option

Take these courses:

CS 124	3
CS 165	3
CS 235	3
CS 237	3
ECEN 150	3
ECEN 160	3
ECEN 250	4
PH 121	3
	25

Mechanical Engineering Option

Take these courses:

ME 101	1
ME 142	3
ME 172	3
ME 201	2
ME 202	3
ME 204	3
ME 231	3
ME 250	3
ME 250L	1
PH 123	3
	25

Total Major Credits=42

Additional Elective Credits Required for Graduation=1

This major is available on the following tracks:

Fall-Winter---- YES Winter-Spring---- YES Spring-Fall---- YES

Computer Science and Electrical Engineering Pre-approved Clusters

Computer Science			6600
Take these courses:			
CS 124	Introduction to Software Development	3	
CS 165	Object-oriented Software Development	3	
Take 2 courses:			
CS 213	Web Engineering 1	3	
CS 235	Data Structures	3	
CS 237	Discrete Mathematics 1	3	
CS 238	Discrete Mathematics 2	3	
CS 246	Software Design and Development	3	
CS 312	Computer Graphics	3	
CS 371	Human-Computer Interaction	3	
CS 460	Computer Communication & Networks	3	
ECEN 160	Fundamentals of Digital Systems	3	
ECEN 324	Computer Architecture	3	
	Total Credits	**12**	

Electrical and Computer Electrical Engineering			6603
Take these courses:			
CS 124	Introduction to Software Development	3	
CS 165	Object-oriented Software Development	3	
ECEN 150	Electric Circuit Analysis 1	3	
ECEN 160	Fundamentals of Digital Systems	3	
	Total Credits	**12**	

Course Descriptions — Credits*

CS 124 Introduction to Software Development (3:3:0)
Course Requirement: High School Algebra
CS 124, Introduction to Programming, is the first step in the computer science major tract. The goal of this class is that each student will be able to solve problems in C ++ and have a solid foundation in software development methodology.
(Fall, Winter, Spring)

CS 165 Object-Oriented Software Development (3:3:0)
Prerequisites: CS 124
Software design and development using the object-oriented paradigm; algorithm formulation and object-oriented programming
(Fall, Winter, Spring)

CS 213 Web Engineering 1 (3:3:0)
Prerequisites: CS 165
Internet and Web basics. Web fundamentals - web terminology, web browsers and web servers. This course teaches the concepts behind the fundamental tools used for building client-side web applications. It emphasizes client side programming standards and programming tools used to create dynamic web applications.
(Fall, Winter)

CS 235 Data Structures (3:3:0)
Prerequisites: CS 165
Builds on the foundation of CS 124 and CS 165 to introduce the fundamental concepts of data structures and the algorithms that proceed from them
(Fall, Winter, Spring)

CS 237 Discrete Mathematics 1 (3:3:0)
Prerequisites: CS 165; FDMAT 112
Introduces the mathematical topics needed to provide a solid theoretical foundation for computer science and computer and electrical engineering
(Fall, Winter, Spring)

CS 238 Discrete Mathematics 2 (3:3:0)
Prerequisites: CS 237
Continues the mathematical topics needed to provide a solid theoretical foundation for computer science
(Fall, Winter)

CS 246 Software Design and Development (3:3:0)
Prerequisites: CS 235
Advanced object-oriented design and software development
(Fall, Winter)

CS 290 Special Topics (1-3:0:0)
Repeatable Course: may earn maximum of 6 credits
Course Requirement: Instructor Authorization
Faculty/Student consultation will determine an area of study/research that will give an advanced student greater appreciation and experience in this field. Terms of enrollment, credit, etc., will be determined by the instructor.
(Fall, Winter, Spring)

CS 306 Algorithms and Complexity (3:3:0)
Prerequisites: CS 235; CS 237
Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, and algorithmic strategies.
(Winter)

CS 308 Technical Communication (3:4:2)
Prerequisites: Advanced Writing; CS 165 or CIT 336
Technical writing and presentation to technical audiences; professional communication including resumes and job interviews
(Fall, Winter, Spring)

CS 312 Computer Graphics (3:3:0)
Prerequisites: FDMAT 109 or (FDMAT 110 and MATH 111) or FDMAT 112
Effectively use freely available source tools and C programming API's, including Blender, OpenGL, and SDL, with an introduction to sound, physics, and networking libraries.
(Winter)

CS 313 Web Engineering 2 (3:3:0)
Prerequisites: CIT 336 or (CS 213 and CS 246)
This course builds upon Web Engineering 1 allowing students to create more advanced web applications and services. The emphasis of this course will be on server-side technologies and n-tier applications using relational database technology. Different server-side technologies will be used for creating dynamic n-tier web applications. Client-side technologies will be enhanced and combined with server-side technologies to create rich web applications.
(Winter, Spring)

CS 345 Operating Systems (3:3:0)
Prerequisites: ECEN 324
Analysis of methods used by operating systems to perform typical system services, including: process control, memory management, scheduling, I/O, file management, and concurrency.
(Spring)

CS 364 Software Engineering 1 (4:4:1)
Prerequisites: CS 308; CS 246 or instructor authorization
Software engineering overview; software requirements engineering including elicitation and specification; software design
(Winter, Spring)

CS 371 Human-Computer Interaction (3:3:0)
This class will follow the development lifecycle of a single user interface (UI) intensive project building a new UI for the windows media player. During this process, we will: 1. Identify a target user. 2. Build a scenario in which this user will interact with the product. 3. Create a paper prototype of the UI. 4. Develop a functional specification. 5. Build the project into a workable media player skin. 6. Conduct a usability study with people matching the target user (and a few not). 7. Redesign and rebuild the project to account for findings of the study.
(Winter, Spring)

CS 398 Internship (1-4:0:0)
Repeatable Course: may earn maximum of 4 credits
Prerequisite: CS 246 and consent of Department Internship Coordinator
Planned and supervised practical experience in vocational or educational settings; interns acquire practical skills while applying classroom theory and principles
(Fall, Winter, Spring)

CS 416 Software Engineering 2 (2:2:0)
Prerequisites: CS 246; CS 308
Software quality engineering including testing and verification and validation; software metrics; software cost estimation
(Spring)

CS 432 Software Engineering 3 (3:3:0)
Prerequisites: CS 246; CS 308
Software process and project management
(Spring)

CS 460 Computer Communication and Networks (3:3:0)
Prerequisites: CS 246 or non CS majors: CS 235 and instructor authorization
Introduction to computer networking and network programming with an Internet focus, including: applications, protocols, transport services, IP, routing, LANs, wireless and security.
(Winter)

CS 470 Computer Security (3:3:0)
Prerequisites: CS 308
CS 470, Computer Security, is essentially a research class. The purpose of this class is to help each student develop the skills necessary to become a security expert in whatever domain of computer security that is important to their job when they enter the work force.
(Winter)

CS 480 Computational Theory (3:3:0)
Prerequisites: CS 306
Finite automata, regular expressions, grammars, languages, Turing machines, computability, complexity, P and NP problems
(Spring)

CS 490R Special Topics (3:3:0)
Repeatable Course: may earn maximum of 6 credits
Course Requirement: Instructor Authorization
Current topics in Computer Science
(Fall, Winter, Spring)

CS 498R Internship (1-4:0:0)
Repeatable Course: may earn maximum of 4 credits
Prerequisites: CS 398
Planned and supervised practical experience in vocational or educational settings; interns acquire practical skills while applying classroom theory and principles
(Fall, Winter, Spring)

CS 499 Senior Project (3:3:0)
Prerequisites: CS 364
Directed individual or group research and study of a topic in computer science not covered by the curriculum. The topic shall be such that the student shall 1) demonstrate he/she has learned how to learn and 2) apply material covered by the curriculum to understand a new topic.
(Fall, Winter, Spring)

CS 499A Senior Project, Part A (2:2:0)
Prerequisites: CS 364
Directed individual or group research and study of a topic in computer science not covered by the curriculum. Part A of the senior project includes proposal preparation, research, requirements specification, and other activities as specified in the proposal.
(Fall, Winter, Spring)

CS 499B Senior Project, Part B (1:1:0)
Prerequisites: CS 499A
Completion of the senior project started in CS 499A as specified in the proposal and requirements specification.
(Fall, Winter, Spring)

CS 499S Senior Project Supplemental (1-2:1:0)
Co-requisite: CS 499
An extension of CS 499, Senior Project; allows the Senior Project student to engage in a more significant project by registering for an extra one or two credits.
(Fall, Winter, Spring)

ECEN 150 Electric Circuit Analysis 1 (3:2:2)
Prerequisites: Proficiency in algebra, exposure to trigonometry
Introduction to electrical and computer engineering. Analysis and design of DC and AC circuits. Resistors, capacitors, inductors, transformers, and batteries. Ohms Law, power and network theorems. Steady state and frequency domain analysis. A student project and presentation is required. Laboratory exercises are included.
(Fall, Winter, Spring)

ECEN 160 Fundamentals of Digital Systems (3:2:2)
Prerequisites: CS 124
Exploration of the fundamentals of digital systems including: number systems, truth tables, Boolean algebra, Karnaugh maps, combinational logic circuits (SSI, MSI and programmable circuits), sequential logic circuits (flip-flops, counters, and shift registers), and state machine design and analysis. Students must design and build a project that uses sequential logic and a programmable logic device. A student presentation is required. Laboratory exercises are included.
(Fall, Winter, Spring)

ECEN 250 Electric Circuit Analysis 2 (4:3:2)
Prerequisites: ECEN 150
Co-requisites: Math 316
Analysis and design of DC and AC circuits. Transient analysis using differential equations. Laboratory exercises are included.
(Winter, Spring)

ECEN 260 Microprocessor Based-System Design (3:2:2)
Prerequisites: CS 165; ECEN 160; ECEN 224
This course covers the architecture, applications, programming, and interfacing of commercial microprocessors and micro controllers. In addition, students will learn about device driver development and other computer input/output systems. Laboratory exercises are included.
(Fall, Winter)

ECEN 324 Computer Architecture (3:2:2)
Prerequisites: CS 235 or ECEN 260
Computer system and processor architecture including: instruction sets, control unit and data path design, memory hierarchy, pipelining, I/O, and program performance optimization. Laboratory exercises are included.
(Winter, Spring)

ECEN 340 Digital Systems Design (3:2:2)
Prerequisites: ECEN 160 or ECEN 224
Hierarchical design of digital systems. Synchronous state machine design, including the use of ROMs, one-hot count sequences, and other variations. Asynchronous state machine design. Circuit synthesis and simulation using the Verilog hardware description language. Circuit implementation field programmable gate arrays (FPGAs). A technical report and presentation is required. Laboratory exercises are included.
(Winter)

ECEN 350 Electronic Devices and Circuits (3:2:2)
Prerequisites: ECEN 150
Introduction to semiconductor devices. Principles of rectifiers, zener diodes, and other pn junction devices. Diode applications such as voltage rectifiers, voltage multipliers, voltage regulators, clippers, and clampers. Principles, biasing, modeling, and small signal applications of bipolar junction transistors and field effect transistors. Students must design, build, and demonstrate electronic equipment that meets given specifications. A student presentation is required. Laboratory exercises are included.
(Winter)

ECEN 380 Signals and Systems (3:2:2)
Prerequisites: ECEN 250; MATH 316
The main goal of this class is to develop the classical signals and systems analysis theory for both continuous and discrete-time cases. The course includes: signals and systems and their properties, linear time-invariant systems, stability analysis, sampling of continuous-time signals, z-transform, discrete Fourier transform, time and frequency domain representations of discrete-time signals and systems, and introductory concepts in communications.
(Winter)

* Credit Description (Credit Hours : Lecture Hours per week : Lab Hours per week)

ECEN 390 Electricity and Magnetism (3:2:2)

Prerequisites: ECEN 250; MATH 316

This course is an introduction to electromagnetic waves and fields. Students will learn the properties of electric and magnetic field theories and their applications. These applications include transmission lines, capacitors, inductors, electrical motors and generators, photonics, and antennas. Laboratory experiments are included.

(Winter)

ECEN 398R Internship (1-7:0:0)

Repeatable Course: may earn maximum of 7 credits

Prerequisites: ECEN 250 and Instructor Authorization

Full-time employment as an electrical engineering or a computer engineering intern for one semester or more.

(Fall, Winter, Spring)

ECEN 420 RF Circuits (3:2:2)

Prerequisites: ECEN 350

This course is an introduction to RF circuits. Students will learn the basics of key RF components including high frequency transistors, filters, mixers, oscillators, and phase locked loops. Students will also be introduced to laboratory test equipment, network analysis and the fundamentals of transmission lines. Finally the students will understand basic high frequency test equipment. Laboratory experiments are included.

(Spring)

ECEN 430 Power Electronics (3:2:2)

Prerequisites: ECEN 380

Co-requisites: ECEN 350

Introduction to power semiconductor devices, magnetic circuits, transformers, half-wave and full-wave diode and phase rectifiers, switching converters, and motor drivers.

(Spring)

ECEN 440 Data and Computer Communications (3:2:2)

Prerequisites: ECEN 250

Fundamentals of data and computer communications focusing on the physical and data link layers of the OSI architecture. Laboratory exercises are included.

(Winter)

ECEN 450 VLSI System Design (3:2:2)

Prerequisites: ECEN 340

This course covers advanced digital design concepts including design methodologies, tools, and functional verification of HDL models. VLSI concepts are also covered, including the translation of HDL to gates, to transistors, and then to functional silicon. CMOS transistor concepts with special attention to the digital CMOS silicon manufacturing process are also stressed as well as formal validation of silicon components. The class meets for 135 minutes twice each week. Laboratories are integrated with lectures.

(Spring)

ECEN 460 Real-Time and Embedded Systems (3:2:2)

Prerequisites: ECEN 260

Hardware/software interface, real-time kernel internals, implementation of high-level language constructs issues in real-time application software development

(Winter)

ECEN 470 Feedback Control of Dynamic Systems (3:2:2)

Prerequisites: MATH 316

Dynamic modeling, dynamic response, analysis and design of feedback control

(Winter)

ECEN 480 Digital Signal Processing (3:2:2)

Prerequisites: ECEN 380

Time and frequency domain analysis of discrete time systems subjected to periodic or non-periodic input signals. Digital signal processing, fast Fourier transforms, digital filter design, spectrum analysis and applications. Laboratory exercises are included.

(Winter)

ECEN 490 Special Topics (3:2:2)

Course Requirement:: Instructor Authorization

In this class you will be introduced to the elements and analysis of Power Systems, including a survey of the methods and tools used to study the generation and movement of electric power throughout a power grid. The class will both introduce the concepts that govern the generation and flow of power and the computer-based tools that are used in industry to understand them. We will also cover the devices normally associated with renewable energy in the electric grid, for example, wind and solar power sources.

(Spring)

ECEN 499 Senior Project (3:2:2)

Total Course Fee: $111.00

Prerequisites: ECEN 398 and instructor authorization

Culminating design experience based on skills learned in advanced technical courses. Students work in teams to plan, design, test and demonstrate a major project. Instructor authorization is required and the completion of at least two 400-level ECEN courses.

(Winter, Spring)