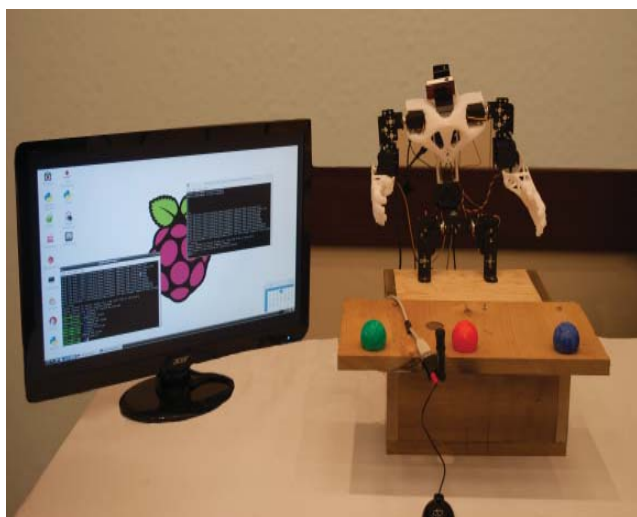


Department of

Computer Science & Electrical Engineering



Richard Grimmett, Department Chair
Scott Burton, Scott Ercanbrack, Rex Fisher, Richard Grimmett,
James Helfrich, Ron Jones, Eric Karl, Rick Neff, Kevin Smith,
Kevin Twitchell

Merlynn Price, Department Secretary (208) 496-7600
<http://www.byui.edu/CSEE/>

Introduction

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.

Six degree programs are offered:

1. A.A.S. in Electrical and Computer Engineering
2. A.A.S. in Computer Programming
3. B.S. in Computer Science
4. B.S. in Software Engineering
5. B.S. in Electrical Engineering
6. B.S. in Computer Engineering

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

1. Have a thorough grounding in the fundamental principles and practices of their respective degree programs
2. Have learned how to learn
3. Be prepared for a successful career
4. 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.

A.A.S. in Electrical and Computer Engineering

The A.A.S. in Electrical and Computer Engineering provides a solid foundation in basic computer and electronic systems. This includes knowledge and skills in computer programming, computer system design, and analog electronics. Students will be taught problem solving skills that will allow them to debug and correct electronic system errors. The primary target audience for this degree is Pathway and online degree students.

A.A.S. in Computer Programming

The A.A.S. in Computer Programming provides a solid foundation in both the breadth and depth of computer programming. This includes knowledge and skills in several programming languages as well as the principles and practices of software development. Students will be taught problem solving skills that will allow them to debug and correct software system errors. The primary target audience for this degree is Pathway and online degree students.

B.S. in Computer Science

As a computer scientist, imagine creating the next search engine, the next social web site, or even the next "must have" mobile app. 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.

B.S. in Software Engineering

The B.S. Software Engineering Degree is a subset of the B.S. Computer Science Degree. This program provides students with a solid foundation in both the breadth and depth of the principles and practices of software engineering as well as skills in computer programming. In this program of study, students learn and practice the industry standard approach to the design, development and implementation of complex software systems. The B.S. Software Engineering Degree is designed for students who want a strong background in software development coupled with a minor or two clusters in another subject (CS majors are not allowed to declare a minor).

B.S. in 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

The Electrical Engineering Program is fully accredited by the EAC Accreditation Commission of ABET.

Computer Science and Electrical Engineering
 Brigham Young University-Idaho 2014-2015

B.S. in Computer Engineering

As a computer engineer, imagine creating the next super computer, the next revolutionary tablet computer, 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

The Computer Engineering Program is fully accredited by the EAC Accreditation Commission of ABET.

AAS in Electrical and Computer Engineering (384)

Take required Foundations courses (17 credits)

Major Requirements

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

| | | | |
|-----------------------------|-----------------------------------|-----------|-----------------------|
| Core Courses | <i>cont. from previous column</i> | | Program Notes: |
| <i>Take these courses:</i> | ECEN 150 | 3 | |
| CHEM 105 | ECEN 160 | 3 | |
| CS 124 | ECEN 250 | 4 | |
| CS 165 | ECEN 260 | 3 | |
| CS 235 | MATH 215 | 4 | |
| CS 237 | MATH 316 | 4 | |
| <i>cont. in next column</i> | PH 121 | 3 | |
| | PH 220 | 3 | |
| | | <u>43</u> | |

Total Major Credits=43

Total Credits=60

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

AAS in Computer Programming (385)

Take required Foundations courses (17 credits)

Major Requirements

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

| | | | |
|----------------------------|----------------------------|-------------------------|-----------------------|
| Core Courses | <i>Take these courses:</i> | Elective Courses | Program Notes: |
| <i>Take these courses:</i> | CS 213 | <i>Take 8 credits:</i> | |
| CS 124 | CS 246 | CIT 225 | |
| CS 165 | CS 308 | CIT 261 | |
| CS 235 | CS 313 | CIT 370 | |
| ECEN 160 | CS 364 | CIT 380 | |
| | CS 371 | CS 416 | |
| | CS 499 | CS 432 | |
| | | CS 470 | |
| | | ECEN 324 | |
| | | <u>8</u> | |

Total Major Credits=42

Additional Elective Credits Required for Graduation=1

Total Credits=60

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

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 <i>Take these courses during your first 3 semesters:</i> | Supplemental Courses <i>Take 15 credits:</i> | Math and Science Courses <i>Take 1 course:</i> | Science Courses <i>Take this course:</i> | <i>Program Notes:</i> |
|--------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------|---------------------------------------------|-----------------------|
| CS 124 3 | CIT 225 3 | BIO 240 4 | CHEM 105 4 | |
| CS 165 3 | CS 312 3 | CHEM 106 4 | 4 | |
| CS 235 3 | CS 313 3 | MATH 113 3 | OR | |
| ECEN 160 3 | CS 371 3 | MATH 411 3 | | |
| 12 | CS 450 3 | PH 220 3 | <i>Take these courses:</i> | |
| | CS 460 3 | | PH 121 3 | |
| <i>Take these courses:</i> | CS 480 3 | | PH 150 1 | |
| CS 213 3 | CS 490R 3 | | 4 | |
| CS 237 3 | ECEN 260 3 | | | |
| CS 238 3 | ECEN 361 3 | | | |
| CS 246 3 | 15 | | | |
| CS 306 3 | <i>Take 1 course:</i> | | | |
| CS 308 3 | CS 398 1-4 | | | |
| CS 345 3 | CS 498R 1-4 | | | |
| CS 364 4 | 1 | | | |
| CS 416 2 | <i>Take 3 credits:</i> | | | |
| CS 432 3 | CS 499 3 | | | |
| CS 470 3 | or | | | |
| ECEN 324 3 | CS 499A 2 | | | |
| MATH 330 3 | CS 499B 1 | | | |
| MATH 341 3 | 3 | | | |
| 42 | | | | |

Total Major Credits=80

Total Credits=120

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

BS in Software Engineering (443)

Take required Foundations courses

Major Requirements

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

| Core Courses <i>Take these courses:</i> | <i>Take these courses:</i> | Elective Courses <i>Take 15 credits:</i> | <i>Program Notes:</i> |
|--------------------------------------------|----------------------------|---------------------------------------------|-----------------------|
| CS 124 3 | CS 213 3 | CS 237 3 | |
| CS 165 3 | CS 246 3 | CS 313 3 | |
| CS 235 3 | CS 308 3 | CS 345 3 | |
| ECEN 160 3 | CS 364 4 | CS 460 3 | |
| 12 | CS 371 3 | CS 490R 3 | |
| | CS 398 1-4 | ECEN 324 3 | |
| | CS 416 2 | ECEN 361 3 | |
| | CS 432 3 | MATH 221A 3 | |
| | CS 470 3 | CIT 225 3 | |
| | CS 499 3 | CIT 261 3 | |
| | 28 | CIT 370 3 | |
| | | CIT 380 3 | |
| | | 15 | |

Total Major Credits=55

Additional Elective Credits Required for Graduation=25

Total Credits=120

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

Computer Science and Electrical Engineering
Brigham Young University-Idaho 2014-2015

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: | Supplemental Courses | Math and Science Courses | Program Notes: |
|----------------------------------------------------------|---------------------|------------------------|--------------------------|----------------|
| <i>Take these courses during your first 2 semesters:</i> | | <i>Take 6 courses:</i> | <i>Take 1 course:</i> | |
| CS 124 3 | CHEM 105 4 | ECEN 324 3 | BIO 221 3 | |
| CS 241 4 | CS 237 3 | ECEN 351 3 | BIO 240 4 | |
| ECEN 150 3 | CS 308 3 | ECEN 361 3 | BIO 264 & 264L 4 | |
| ECEN 160 3 | ECEN 250 4 | ECEN 410 3 | CHEM 106 4 | |
| <u>3</u> | ECEN 260 3 | ECEN 420 3 | CS 238 3 | |
| 13 | ECEN 340 3 | ECEN 430 3 | MATH 341 3 | |
| | ECEN 350 3 | ECEN 440 3 | MATH 411 3 | |
| | ECEN 380 3 | ECEN 451 3 | MATH 423 3 | |
| | ECEN 390 3 | ECEN 461 3 | PH 123 3 | |
| | ECEN 398R 1-7 | ECEN 470 3 | PH 127 <u>3</u> | |
| | ECEN 499 3 | ECEN 480 3 | | |
| | MATH 215 4 | ECEN 490R 3 | | |
| | MATH 316 4 | ME 310 <u>2</u> | | |
| | MATH 330 3 | | | |
| | PH 220 <u>3</u> | | | |
| | 47 | 17 | | |

Total Major Credits=80

Total Credits=120

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 | Science | Cultural Awareness | Eternal Truths | |
|-------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|
| Quantitative Reasoning <i>Take these courses:</i> | Science Foundations <i>Take this course:</i> | American Foundations <i>Take this course:</i> | Family Foundations <i>Take this course:</i> | Other Religion Courses <i>Take 4 credits:</i> |
| FDMAT 112 4 | FDSCI 101 <u>2</u> | FDAMF 101 <u>3</u> | FDREL 200 <u>2</u> | FDREL 100 2 |
| FDMAT 108T <u>1</u> | | | | FDREL 130 2 |
| 5 | | | | FDREL 150 2 |
| Reading and Writing <i>Take these courses:</i> | Science Issues <i>Take this course:</i> | Humanities Foundations <i>Take this course:</i> | Book of Mormon <i>Take these courses:</i> | FDREL 190 1-3 |
| FDENG 101 3 | PH 121 <u>3</u> | FDCA 101 <u>3</u> | FDREL 122 2 | FDREL 215 2 |
| FDENG 201 <u>3</u> | | | FDREL 121 <u>2</u> | FDREL 234 2 |
| 6 | | | 4 | FDREL 235 2 |
| | | AND | | FDREL 261 2 |
| | | International Foundations | Scripture Based Courses <i>Take 4 credits:</i> | FDREL 333 2 |
| | | <i>Take 1 course:</i> | FDREL 211 2 | FDREL 341 2 |
| | | FDCA 201 2 | FDREL 212 2 | FDREL 342 3 |
| | | FDCA 202 2 | FDREL 301 2 | FDREL 343 3 |
| | | FDCA 203 2 | FDREL 302 2 | FDREL 351 2 |
| | | FDCA 204 2 | FDREL 324 2 | FDREL 352 2 |
| | | FDCA 205 2 | FDREL 325 2 | FDREL 431 2 |
| | | FDCA 206 <u>2</u> | FDREL 327 2 | FDREL 471 2 |
| | | 2 | FDREL 404 <u>2</u> | FDREL 475 <u>2</u> |
| | | OR | 4 | 4 |
| | | World Foundations | | |
| | | <i>Take these courses:</i> | | |
| | | FDWLD 101 2 | | |
| | | FDWLD 201 <u>3</u> | | |
| | | 5 | | |
| | | Connections | | |
| | | <i>Take this course:</i> | | |
| | | FDCNC 350 <u>2</u> | | |
| | | 2 | | |

Total Foundation Credits for Mechanical Engineering=40

Computer Science and Electrical Engineering
Brigham Young University-Idaho 2014-2015

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: | Supplemental Courses | Math and Science Courses | Program Notes: |
|----------------------------------------------------------|---------------------|------------------------|--------------------------|----------------|
| <i>Take these courses during your first 2 semesters:</i> | CHEM 105 4 | <i>Take 3 courses:</i> | <i>Take 1 course:</i> | |
| CS 124 3 | CS 235 3 | ECEN 351 3 | BIO 221 3 | |
| CS 165 3 | CS 237 3 | ECEN 380 3 | BIO 240 4 | |
| ECEN 150 3 | CS 246 3 | ECEN 390 3 | BIO 264 & 264L 4 | |
| ECEN 160 3 | CS 308 3 | ECEN 410 3 | CHEM 106 4 | |
| <u>3</u> | CS 345 3 | ECEN 420 3 | CS 238 3 | |
| 12 | ECEN 250 4 | ECEN 430 3 | MATH 341 3 | |
| | ECEN 260 3 | ECEN 440 3 | MATH 411 3 | |
| | ECEN 324 3 | ECEN 451 3 | MATH 423 3 | |
| | ECEN 340 3 | ECEN 461 3 | PH 123 3 | |
| | ECEN 350 3 | ECEN 470 3 | PH 127 <u>3</u> | |
| | ECEN 361 3 | ECEN 480 3 | 3 | |
| | ECEN 398R 1-7 | ECEN 490R 3 | | |
| | ECEN 499 3 | CS 313 3 | | |
| | MATH 215 4 | CS 364 4 | | |
| | MATH 316 4 | CS 371 3 | | |
| | MATH 330 3 | CS 416 2 | | |
| | PH 220 <u>3</u> | CS 432 3 | | |
| | 56 | CS 460 3 | | |
| | | CS 470 3 | | |
| | | CS 480 3 | | |
| | | CS 490R <u>3</u> | | |
| | | 8 | | |

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 | Science | Cultural Awareness | Eternal Truths | Other Religion Courses |
|-------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------|------------------------|
| Quantitative Reasoning <i>Take these courses:</i> | Science Foundations <i>Take this course:</i> | American Foundations <i>Take this course:</i> | Family Foundations <i>Take this course:</i> | Take 4 credits: |
| FDMAT 112 4 | FDSCI 101 <u>2</u> | FDAMF 101 <u>3</u> | FDREL 200 <u>2</u> | FDREL 100 2 |
| FDMAT 108T <u>1</u> | 2 | 3 | 2 | FDREL 130 2 |
| 5 | | | | FDREL 150 2 |
| | Science Issues | Humanities Foundations | Book of Mormon | FDREL 190 1-3 |
| Reading and Writing | <i>Take this course:</i> | <i>Take this course:</i> | <i>Take these courses:</i> | FDREL 215 2 |
| <i>Take these courses:</i> | PH 121 <u>3</u> | FDCA 101 <u>3</u> | FDREL 121 2 | FDREL 234 2 |
| FDENG 101 3 | 3 | 3 | FDREL 122 <u>2</u> | FDREL 235 2 |
| FDENG 201 <u>3</u> | | | 4 | FDREL 261 2 |
| 6 | | International Foundations | Scripture Based Courses | FDREL 333 2 |
| | | <i>Take 1 course:</i> | <i>Take 4 credits:</i> | FDREL 341 2 |
| | | FDCA 201 2 | FDREL 211 2 | FDREL 342 3 |
| | | FDCA 202 2 | FDREL 212 2 | FDREL 343 3 |
| | | FDCA 203 2 | FDREL 301 2 | FDREL 351 2 |
| | | FDCA 204 2 | FDREL 302 2 | FDREL 352 2 |
| | | FDCA 205 2 | FDREL 324 2 | FDREL 431 2 |
| | | FDCA 206 <u>2</u> | FDREL 325 2 | FDREL 471 2 |
| | | 2 | FDREL 327 2 | FDREL 475 <u>2</u> |
| | | Connections | FDREL 404 <u>2</u> | 4 |
| | | <i>Take this course:</i> | 4 | |
| | | FDNC 350 <u>2</u> | | |
| | | 2 | | |

Total Foundation Credits for Mechanical Engineering=40

Software Engineering Concentration (D 106)

Concentration Requirements

No Double Counting of Concentration Courses

| Core Courses <i>Take these courses:</i> | Software Engineering- Module <i>Take these courses:</i> | Supplemental Courses <i>Take 6 credits of upper division courses not included in concentration core or selected emphasis area:</i> | <i>continued from previous column</i> | <i>Program Notes:</i> |
|--------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------|
| CS 124 3 | CS 308 3 | CS 306 3 | ECEN 350 3 | |
| CS 165 3 | CS 364 4 | CS 312 3 | ECEN 351 3 | |
| CS 235 3 | CS 371 3 | CS 313 3 | ECEN 361 3 | |
| CS 246 3 | CS 416 2 | CS 345 3 | ECEN 380 3 | |
| IDS 398R 1-3 | CS 432 3 | CS 398 1-4 | ECEN 390 3 | |
| IDS 499 2 | | CS 450 3 | ECEN 398R 1-7 | |
| <u> 15</u> | | CS 460 3 | ECEN 420 3 | |
| | | CS 470 3 | ECEN 430 3 | |
| | | CS 480 3 | ECEN 440 3 | |
| | | CS 490R 3 | ECEN 470 3 | |
| | | CS 498R 1-4 | ECEN 480 3 | |
| | | ECEN 324 3 | ECEN 490R 3 | |
| | | ECEN 340 3 | <u> 6</u> | |
| | | <i>continued next column</i> | | |

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 <i>Take these courses:</i> | Supplemental Courses <i>Take 9 credits of upper division courses not included in concentration core or selected emphasis area:</i> | <i>continued from previous column</i> | <i>Program Notes:</i> |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------|
| CS 124 3 | CS 306 3 | ECEN 324 3 | |
| CS 165 3 | CS 308 3 | ECEN 340 3 | |
| CS 235 3 | CS 312 3 | ECEN 350 3 | |
| CS 246 3 | CS 345 3 | ECEN 351 3 | |
| IDS 398R 1-3 | CS 364 4 | ECEN 361 3 | |
| IDS 499 2 | CS 371 3 | ECEN 380 3 | |
| <u> 15</u> | CS 398 1-4 | ECEN 390 3 | |
| | CS 416 2 | ECEN 398R 1-7 | |
| | CS 432 3 | ECEN 420 3 | |
| | CS 450 3 | ECEN 430 3 | |
| | CS 480 3 | ECEN 440 3 | |
| | CS 490R 3 | ECEN 470 3 | |
| | CS 498R 1-4 | ECEN 480 3 | |
| | <i>continued next column</i> | ECEN 490R 3 | |
| | | <u> 9</u> | |

Total Concentration Credits=36

This Concentration is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

Electrical and Computer Engineering Concentration (D 143)

Concentration Requirements

No Double Counting of Concentration Courses

| | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Core Courses: <i>Take these courses:</i> ECEN 150 3 ECEN 160 3 ECEN 260 3 ECEN 324 3 ECEN 340 3 ECEN 350 3 ECEN 351 3 ECEN 361 3 CS 124 3 CS 165 3 <hr style="width: 10%; margin-left: 0;"/> 30 | Interdisciplinary Courses: <i>Take these courses:</i> IDS 398R 1-3 IDS 499 3 <hr style="width: 10%; margin-left: 0;"/> 3 | Program Notes: |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|

Total Concentration Credits=33

This Concentration 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 <i>Take these courses:</i> CS 124 Introduction to Software Development 3 CS 165 Object-oriented Software Development 3 <i>Take 2 courses:</i> 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 <hr style="width: 10%; margin-left: 0;"/> Total Credits 12 | Electrical and Computer Engineering 6603 <i>Take these courses:</i> 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 <hr style="width: 10%; margin-left: 0;"/> Total Credits 12 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Course Descriptions

Credits*

CS 101 Introduction to Programming (2:2:0)
 This course provides an introduction to computer programming intended for people with no programming experience. This course is recommended for non-majors in order to get an overview of programming principles and techniques. This course covers the basics of programming in Python including elementary data types (numeric types, strings, lists, dictionaries and files), control flow, functions, objects, methods, fields and mutability. (Winter, Spring, Fall)

CS 124 Introduction to Software Development (3:3:0)
 This 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. (Winter, Spring, Fall)

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

CS 213 Web Engineering I (3:3:0)
 Prerequisite: 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. (Winter, Fall)

CS 235 Data Structures (3:3:0)
 Prerequisite: 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. (Winter, Spring, Fall)

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

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

CS 241 Software Development for Electrical Engineering (4:4:1)
 Prerequisite: CS 124
 This course provides an introduction to Object Oriented (OO) programming concepts for Electrical Engineers. Additionally, this course introduces students to basic data structure and algorithm design techniques as well as shell programming. C++, Perl, Matlab, and Python programming languages will be used throughout the class. (Winter, Spring, Fall)

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

CS 290 Special Topics (1-3:0:0)
 Repeatable Course: may earn maximum of 6 credits
 Prerequisite: 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. (Winter, Spring, Fall)

CS 306 Algorithms and Complexity (3:3:0)
 Prerequisites: CS 235 and 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 (3:3:1)
 Prerequisites: CS 165 or CIT 336
 Technical writing and presentation to technical audiences; professional communication including resumes and job interviews; collaboration. (Winter, Spring, Fall)

CS 312 Computer Graphics (3:3:0)
 Prerequisite: CS 235
 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 II (3:3:0)
 Prerequisites: CS 213 and CS 246; or CIT 336
 This course builds upon Web Engineering I 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)
 Prerequisite: 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 I (4:3:1)
 Prerequisites: CS 308; and (CS 246 or CIT 336)
 Software engineering overview; software requirements engineering including elicitation and specification; software design. (Winter, Spring)

CS 371 Human-Computer Interaction (3:3:0)
 Prerequisite: Junior Status
 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
 Planned and supervised practical experience in vocational or educational settings; interns acquire practical skills while applying classroom theory and principles. (Winter, Spring, Fall)

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

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

Computer Science and Electrical Engineering

Brigham Young University–Idaho 2014-2015

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CS 450 Machine Learning and Data Mining (3:3:0) Prerequisite: CS 246 This course is an introduction to the process of using machine learning to mine knowledge and patterns from data. Students will be introduced to several different algorithms spanning both supervised and unsupervised learning, and learn how to appropriately apply them in data mining. This course will examine methods that have emerged and proven to be of value in recognizing patterns and making predictions from an applications perspective. We will survey applications and provide an opportunity for hands-on experimentation with algorithms for data mining using easy-to-use software and cases. (Spring) | ECEN 150 Electric Circuit Analysis I (3:2:2) Prerequisite: 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. (Winter, Spring, Fall) |
| CS 460 Computer Communication and Networks (3:3:0) Prerequisite: 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) | ECEN 160 Fundamentals of Digital Systems (3:2:2) Prerequisite: 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. (Winter, Spring, Fall) |
| CS 470 Computer Security (3:3:0) Prerequisite: 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) | ECEN 250 Electric Circuit Analysis II (4:3:2) Prerequisite: ECEN 150 Co-requisite: MATH 316 Analysis and design of DC and AC circuits. Transient analysis using differential equations. Laboratory exercises are included. (Winter, Spring) |
| CS 480 Computational Theory (3:3:0) Prerequisite: CS 306 Finite automata, regular expressions, grammars, languages, Turing machines, computability, complexity, P and NP problems. (Spring) | ECEN 260 Microprocessor Based-System Design (3:2:2) Prerequisites: CS 165 and ECEN 160 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. (Winter, Fall) |
| CS 490R Special Topics (3:3:0) Repeatable Course: may earn a maximum of 6 credits Current topics in Computer Science. (Winter, Spring, Fall) | 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) |
| CS 498R Internship (1-4:0:0) Repeatable Course: may earn maximum of 4 credits Prerequisite: CS 398 Planned and supervised practical experience in vocational or educational settings; interns acquire practical skills while applying classroom theory and principles. (Winter, Spring, Fall) | ECEN 340 Digital Systems Design (3:2:2) Prerequisite: ECEN 260 Hierarchical design of digital systems. 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) |
| CS 499 Senior Project (3:3:0) Prerequisite: 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. (Winter, Spring, Fall) | ECEN 350 Electronic Devices and Circuits (3:2:2) Prerequisite: 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) |
| CS 499A Senior Project, Part A (2:2:0) Prerequisite: 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. (Winter, Spring, Fall) | ECEN 351 VLSI System Design (3:2:2) Prerequisite: 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 a week. Laboratories are integrated with lectures. (Winter) |
| CS 499B Senior Project, Part B (1:1:0) Prerequisite: CS 499A Completion of the senior project started in CS 499A as specified in the proposal and requirements specification. (Winter, Spring, Fall) | ECEN 361 Embedded Systems (3:2:2) Prerequisite: ECEN 260 Hardware/software interface, real-time kernel internals, implementation of high-level language constructs issues in real-time application software development. (Winter) |
| CS 499S Senior Project Supplemental (1-2:0:0) 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. (Winter, Spring, Fall) | |

ECEN 380 Signals and Systems**(3:2:2)**

Prerequisites: ECEN 250 and 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)

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

Prerequisites: ECEN 250 and 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

Prerequisite: ECEN 250 and Instructor Authorization

Full-time employment as an electrical engineering or a computer engineering intern for one semester or more (at least 450 hours).

(Winter, Spring, Fall)

ECEN 410 Power Systems**(3:2:2)**

Prerequisite: ECEN 250

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.

(Winter)

ECEN 420 RF Circuits**(3:2:2)**

Prerequisite: 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)**

Prerequisite: ECEN 250

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)**

Prerequisite: 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 451 Semiconductor Process Engineering**(3:2:2)**

Prerequisite: ECEN 350

This course is an introduction to Semiconductor Process Engineering. Students will learn the process steps for manufacturing semiconductor devices. This includes the technologies, equipment, process chemistry and physics, and process engineering aspects of each process step. In addition students will understand clean room technology and protocol, control and monitoring of defects and ESD. Practical statistical process control and six-sigma methodologies will be emphasized.

(Spring)

ECEN 461 Advanced Embedded Systems**(3:2:2)**

Prerequisites: ECEN 324 and ECEN 361

This course is intended to give students a deeper insight into system integration and the structure and functionality of system software for embedded systems. It is also intended to give students insights into the challenges of real-time system development, including concepts like PID controllers, advanced real-time operating systems, and hardware connectivity.

(Spring)

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

Prerequisite: MATH 316

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

(Winter)

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

Prerequisite: 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 490R Special Topics**(3:2:2)**

Repeatable course: may earn a maximum of 6 credits

Course Requirement: Instructor Authorization

Current topics in computer and electrical engineering.

(Winter, Spring, Fall)

ECEN 499 Senior Project**(3:2:2)**

Course Fees: \$111.00

Prerequisite: ECEN 398R 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 consent is required and the completion of at least two 400-level ECEN courses.

(Winter, Spring)