

Standards: [ECE 180: Introduction to Electrical and Computer Engineering BSU Student Learning Outcomes](#)

Note: These standards were created by Boise State University.

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DC Introduction to Electrical and Computer Engineering BSU: Alignment Table

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
SLO 1		x						x
SLO 2		x	x	x	x	x	x	x
SLO 3	x	x	x		x			x
SLO 4	x	x	x		x			x

DC Introduction to Electrical and Computer Engineering BSU: Semiconductors 2 Course Map

Unit 1: What is Electrical and Computer Engineering?

Idaho Standards	Unit Objectives
SLO 3 Prepare students for an engineering education; advising,	discuss the history and foundations of electrical

curriculum, engineering tools. SLO 4 Introduce incoming students to the fields of electrical and computer systems engineering and their sub-disciplines.	engineering and computer science. • explain the different specialties in electrical engineering, computer engineering, and computer science. • discuss your own personal interests and career goals.
Lesson 1: Introduction to Electrical and Computer Engineering	
Lesson Objectives 1. describe the people and things important to engineering and computer science. ◦ correlation: SLO 4 2. reflect on what important technology is most critical in your life. ◦ correlation: SLO 4	Assessments • Objective 1: U1D1: People and Things of Engineering and Computer Science...And You • Objective 2: U1D1: People and Things of Engineering and Computer Science...And You
Lesson 2: What Do Engineers Do?	
Lesson Objectives 1. distinguish the specialty areas in electrical engineering (EE), computer engineering (CE), and computer science (CS). ◦ correlation: SLO 4 2. explain what electrical engineering (EE), computer engineering (CE), and computer science (CS) graduates can do. ◦ correlation: SLO 3, SLO 4	Assessments • Objective 1: U1A1: Where Could I Work? • Objective 2: U1A1: Where Could I Work?
Lesson 3: Charting Your Path	
Lesson Objectives 1. discuss your career values. ◦ correlation: SLO 3 2. identify your “favorite” area of specialization. ◦ correlation: SLO 4 3. assess your values in relation to selecting preferred specializations. ◦ correlation: SLO 3	Assessments • Objective 1: U1A2: My Perfect Job • Objective 2: U1A2: My Perfect Job • Objective 3: U1A2: My Perfect Job

Unit 2: Learning the Basics

Idaho Standards	Unit Objectives
SLO 1 Create community among lower division electrical and computer systems engineering students to enhance your education and to create a framework for your academic success. SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses. SLO 3 Prepare students for an engineering education; advising, curriculum, engineering tools. SLO 4 Introduce incoming students to the fields of electrical and computer systems engineering and their sub-disciplines.	• identify basic electrical and electronic components, including the parts of an Arduino board. • construct a simple Arduino project. • explain the requirements for a Bachelor of Science (BS) degree in electrical engineering (EE), computer engineering (CE), or computer science (CS) at BSU and other Idaho universities.
Lesson 1: Electronic Devices and Their Connection	
Lesson Objectives 1. identify basic electrical and electronic components. ◦ correlation: SLO 2 2. describe how electricity flows in a circuit using the water analogy and basic terminology. ◦ correlation: SLO 2	Assessments • Objective 1: U2L1: Electronic Devices and Their Connection–Drawing the Circuit interactive • Objective 2: U2A1: Electronic Devices and Their Connections Quiz
Lesson 2: First Arduino Project	
Lesson Objectives 1. complete the Arduino setup process for your device. ◦ correlation: SLO 2 2. demonstrate the first LED blinking light and modify the code slightly to change behavior. ◦ correlation: SLO 2	Assessments • Objective 1: U2A2: Arduino Setup • Objective 2: U2A2: Arduino Setup
Lesson 3: Building a Simple Circuit	
Lesson Objectives 1. construct a simple Arduino project on the breadboard and show it behaves correctly.	Assessments • Objective 1: U2D1: Circuit Building Reflections

○ correlation: SLO 1, SLO 2	
Lesson 4: EE, CE, and CS in College	
Lesson Objectives 1. compare and contrast the requirements for electrical engineering (EE), computer engineering (CE), and computer science (CS) degrees at Idaho universities. ○ correlation: SLO 3, SLO 4	Assessments ● Objective 1: U2D2: Comparing Program Requirements

Unit 3: Becoming an Engineer

Idaho Standards	Unit Objectives
SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses. SLO 3 Prepare students for an engineering education; advising, curriculum, engineering tools. SLO 4 Introduce incoming students to the fields of electrical and computer systems engineering and their sub-disciplines.	● identify major issues in ethics that might be experienced as an engineer. ● describe ways to improve your current study habits and explain some of the theory behind how we learn. ● complete a more advanced Arduino UNO R3 project and report your experience.
Lesson 1: Ethics in Engineering	
Lesson Objectives 1. describe the differences and similarities between ethics and morals. ○ correlation: SLO 2 2. identify issues of ethics that are critical for professional engineers and computer scientists. ○ correlation: SLO 4 3. apply personal or professional ethics to example cases. ○ correlation: SLO 2	Assessments ● Objective 1: U3L1: Ethics in Engineering–What Are Ethics? interactive ● Objective 2: U3D1: An Ethical Dilemma Example ● Objective 3: U3D1: An Ethical Dilemma Example
Lesson 2: Having a Growth Mindset	
Lesson Objectives	Assessments

1. identify strategies to help you be successful in college. ○ correlation: SLO 3 2. describe the research into the science of learning. ○ correlation: SLO 3	● Objective 1: U3A1: Growth Mindset and Study Habits Notes ● Objective 2: U3A1: Growth Mindset and Study Habits Notes
Lesson 3: Effective Study Habits	
Lesson Objectives 1. identify strategies to help you be successful in college. ○ correlation: SLO 3 2. describe the research into the science of learning. ○ correlation: SLO 3	Assessments ● Objective 1: U3A1: Growth Mindset and Study Habits Notes ● Objective 2: U3A1: Growth Mindset and Study Habits Notes
Lesson 4: Intermediate Arduino Project	
Lesson Objectives 1. explain the role of sensors in Arduino projects. ○ correlation: SLO 2 2. complete an Arduino project that uses an LCD display as an output device. ○ correlation: SLO 2	Assessments ● Objective 1: U3A2: Thermometer Project Reflection ● Objective 2: U3A2: Thermometer Project Reflection

Unit 4: Circuit Analysis Basics

Idaho Standards	Unit Objectives
SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses.	● identify various circuit topologies. ● analyze series and parallel resistor networks. ● analyze electronic circuits using simple measurement equipment.
Lesson 1: Circuit Topologies	
Lesson Objectives 1. differentiate between series and parallel elements in a circuit. ○ correlation: SLO 2	Assessments ● Objective 1: U4L1: Circuit Topologies–Knowledge Check: Series and Parallel Resistor interactive ● Objective 2: U4A1: Ohm's Law and Equivalent

2. calculate the effective resistance of networks of resistors. correlation: SLO 2	Resistance
Lesson 2: Drawing Circuits in Tinkercad	
Lesson Objectives - create a simple circuit using Tinkercad. - correlation: SLO 2 - draw a circuit with more components in Tinkercad. - correlation: SLO 2	Assessments - Objective 1: U4A2: RGB LED Circuit Drawing - Objective 2: U4A2: RGB LED Circuit Drawing
Lesson 3: Test and Measurement in Tinkercad	
Lesson Objectives - measure current and voltage in a circuit. - correlation: SLO 2 - describe what a diode is and how it behaves in a circuit. - correlation: SLO 2	Assessments - Objective 1: U4A3: Tinkercad Drawing Analysis - Objective 2: U4A3: Tinkercad Drawing Analysis

Unit 5: Success as an Engineer

Idaho Standards	Unit Objectives
SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses. SLO 3 Prepare students for an engineering education; advising, curriculum, engineering tools. SLO 4 Introduce incoming students to the fields of electrical and computer systems engineering and their sub-disciplines.	- identify opportunities for experiential learning during college. - discuss how experiential learning could be part of your college plan. - draw simple circuit schematics from an English-language description of the circuit. - measure more complex circuit behavior.
Lesson 1: Experiential Learning	
Lesson Objectives describe the various opportunities available to learn more about an engineering career while you are in	Assessments - Objective 1: U5D1: My Future Career Priorities Poster - Objective 2: U5D1: My Future Career Priorities Poster

college. ○ correlation: SLO 3, SLO 4 2. identify resources from the State of Idaho to help you going forward. ○ correlation: SLO 3, SLO 4	
Lesson 2: Drawing Schematics	
Lesson Objectives 1. draw schematics using a schematic capture tool. ○ correlation: SLO 2, SLO 3 2. apply circuit analysis to schematics. ○ correlation: SLO 2	Assessments • Objective 1: U5A1: LED Schematic and Circuit • Objective 2: U5A1: LED Schematic and Circuit
Lesson 3: Tinkercad Project	
Lesson Objectives 1. create a Tinkercad design for testing. ○ correlation: SLO 2, SLO 3 2. measure current in a circuit for a combination of voltage and resistor values. ○ correlation: SLO 2, SLO 3 3. write in order to report on your experiment. ○ correlation: SLO 2	Assessments • Objective 1: U5A2: LED Circuit Project Lab Data • Objective 2: U5A2: LED Circuit Project Lab Data • Objective 3: U5A2: LED Circuit Project Lab Data

Unit 6: Digital Logic

Idaho Standards	Unit Objectives
SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses.	• convert between binary, decimal, and hexadecimal number systems. • describe simple logic gates including schematic representation, truth tables, and functionality. • simplify logic expressions using Boolean algebra.
Lesson 1: Logic Gates	

Lesson Objectives - convert between binary, decimal, and hexadecimal number systems. - correlation: SLO 2 - describe the fundamental operations of digital logic gates. - correlation: SLO 2	Assessments - Objective 1: U6A1: Binary Conversions - Objective 2: U6A2: Logic Gate Truth Tables
Lesson 2: How Are Logic Gates Made?	
Lesson Objectives - create truth tables to describe the function of logic gates. - correlation: SLO 2 - create more complex functions from basic gates. - correlation: SLO 2	Assessments - Objective 1: U6A2: Logic Gate Truth Tables - Objective 2: U6A2: Logic Gate Truth Tables
Lesson 3: Boolean Algebra	
Lesson Objectives - identify the rules of Boolean algebra. - correlation: SLO 2 - draw simple logic schematics with Scheme-it. - correlation: SLO 2 - simplify Boolean algebra expressions. - correlation: SLO 2	Assessments - Objective 1: U6D1: Logic Gate Challenge - Objective 2: U6D1: Logic Gate Challenge - Objective 3: U6D1: Logic Gate Challenge

Unit 7: What is a Computer?

Idaho Standards	Unit Objectives
SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses.	- describe the functions that make up a modern computer including memory, storage, processing, and input/output devices. - compare and contrast different types of memory and their advantage/disadvantages. - explain the techniques used to perform high-speed addition in a modern CPU.

Lesson 1: How Does a Computer Compute?	
Lesson Objectives 1. identify hardware and software components of a computer. ○ correlation: SLO 2	Assessments ● Objective 1: U7A1: Hardware and Software
Lesson 2: Memory and Storage	
Lesson Objectives 1. describe different types of computer memory (DRAM, SRAM, registers, Flash, ROM, etc.). ○ correlation: SLO 2 2. compare performance and cost of different memory types. ○ correlation: SLO 2	Assessments ● Objective 1: U7A2: Types of Memory ● Objective 2: U7A2: Types of Memory
Lesson 3: The Brains of the Computer (CPU)	
Lesson Objectives 1. describe the flow of instructions and data through the CPU of a computer. ○ correlation: SLO 2 2. explain how and why computers can do arithmetic so quickly. ○ correlation: SLO 2	Assessments ● Objective 1: U7A3: The CPU Flow ● Objective 2: U7A3: The CPU Flow
Lesson 4: Simple Computer Programming	
Lesson Objectives 1. identify the primary constructs used in most high-level programming languages. ○ correlation: SLO 2	Assessments ● Objective 1: U7A4: Computer Programming

Unit 8: What's Next?

Idaho Standards	Unit Objectives
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SLO 1 Create community among lower division electrical and computer systems engineering students to enhance your education and to create a framework for your academic success. SLO 2 Build student success skills specific to the study of electrical and computer systems engineering, math, and science courses. SLO 3 Prepare students for an engineering education; advising, curriculum, engineering tools. SLO 4 Introduce incoming students to the fields of electrical and computer systems engineering and their sub-disciplines.	• present the final Arduino project. • identify future objectives and plans for education and career success. • describe the hardware and software tools that engineers use.
Lesson 1: What It Means to Study Electrical and Computer Engineering	
Lesson Objectives 1. list education and career goals. ◦ correlation: SLO 2 2. identify education paths for electrical and computer engineering. ◦ correlation: SLO 4 3. describe computer science education opportunities. ◦ correlation: SLO 4	Assessments • Objective 1: U8A1: My Perfect Job, Take Two • Objective 2: U8A1: My Perfect Job, Take Two • Objective 3: U8A1: My Perfect Job, Take Two
Lesson 2: Tools of Engineering and Computer Science	
Lesson Objectives 1. describe several pieces of lab equipment seen in a BSU ECE lab. ◦ correlation: SLO 3 2. describe some of the software tools used by engineers and computer scientists in school and in the workforce. ◦ correlation: SLO 3	Assessments • Objective 1: U8A2: Engineering and Computer Science Tools • Objective 2: U8A2: Engineering and Computer Science Tools
Lesson 3: Presenting Your Arduino Project	
Lesson Objectives 1. create a presentation describing your final Arduino	Assessments • Objective 1: U8A3: Arduino Project Presentation, U8D1:

project.

- correlation: SLO 3
- 2. provide feedback for your fellow classmates' Arduino project presentations.
 - correlation: SLO 1, SLO 3

Arduino Presentation Peer Celebrations

- Objective 2: U8D1: Arduino Presentation Peer Celebrations