

**ELEC 51A Course Outline as of Fall 2024****CATALOG INFORMATION**

Dept and Nbr: ELEC 51A Title: FUNDAMENTAL ELEC

Full Title: Fundamentals of Electricity

Last Reviewed: 1/28/2019

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Basic physical principles as applied to direct and alternating current, basic circuits, units, components, and test equipment. Includes basic electronics. Electrical safety and energy conservation as applied to household and industrial appliances are evaluated.

**Prerequisites/Corequisites:****Recommended Preparation:**

Course Eligibility for MATH 150A

**Limits on Enrollment:****Schedule of Classes Information:**

Description: Basic physical principles as applied to direct and alternating current, basic circuits, units, components, and test equipment. Includes basic electronics. Electrical safety and energy conservation as applied to household and industrial appliances are evaluated. (Grade Only)

Prerequisites/Corequisites:

Recommended: Course Eligibility for MATH 150A

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:

<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
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<b>CSU Transfer:</b>	Transferable	Effective:	Fall 1981	Inactive:
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<b>UC Transfer:</b>		Effective:		Inactive:
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**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Perform basic Ohm's Law and Watt's Law calculations.
2. Describe the basic characteristics of capacitors, inductors and transformers.
3. Evaluate the energy efficiency of common energy sources and loads.

**Objectives:**

At the conclusion of this course, the student should be able to:

1. Make circuit calculations using Ohm's Law and Watt's Law.
2. Analyze and evaluate series, parallel, and series-parallel circuits.
3. Apply basic circuit law to interpret circuit faults.
4. Identify and give characteristics of rechargeable and non-rechargeable cells and batteries.
5. Translate horsepower into watts and vice-versa when determining motor or generator input and output requirements.
6. Evaluate power operational costs of electrical appliances.
7. Evaluate the feasibility of various energy-saving devices using electronic laws, basic physical principles, and known operating efficiencies of various devices.
8. Explain the basic operating principles and efficiency of solar cells and wind generators.
9. Demonstrate the characteristics of basic magnetism and magnet or non-magnetic properties of common materials.
10. Identify the characteristics of basic direct current (DC) motors.
11. Describe the properties of alternating current (AC) sine wave values.
12. Explain elementary solid state theory as used in electronic devices and circuits.

**Topics and Scope:**

- I. Atomic structure
- II. Ohm's Law and Watt's Law
- III. Units of measurement
- IV. Power law

- V. Series circuits
- VI. Parallel circuits
- VII. Series-parallel circuits
- VIII. Maximum power transfer
- IX. Power and operating costs
- X. Energy cost computations
- XI. Energy saving devices
- XII. Cells and batteries
- XIII. Magnetism
- XIV. DC motors
- XV. Capacitance
- XVI. Inductance
- XVII. Transformers
- XVIII. Alternating-current
- XIX. Elementary solid state theory (Bohr Model)
- XX. Solid state devices
  - A. Diodes
  - B. Transistors
  - C. Integrated circuits (IC)

**Assignment:**

1. Textbook readings (1-2 chapters per week)
2. Homework problem sets (7-15)
3. Quizzes and/or exams (3-10)
4. Final exam

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problem sets

Problem solving  
20 - 30%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes and/or exams, final exam

Exams  
70 - 80%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

**Representative Textbooks and Materials:**

Electricity and Basic Electronics. 8th ed. Matt, Steven. Publisher - Goodheart-Willcox. 2012 (classic)