ENGR-065: Circuit Theory
Lecture 1:
Electrical Engineering Overview and International System of Units

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Topics

1. The overview of electrical systems
2. International system of units (SI)
   - Covered in Sections 1.1, 1.2, and 1.3

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Why Do We Learn Circuit Theory?

- Electrical devices and systems have become a part of our life. This course will provide you with basic knowledge and skills to analyze, design, and develop these electrical devices and systems.
- The course is designed to introduce the fundamental principles (three laws) and the technical skills of how to apply these principles to circuit analysis.

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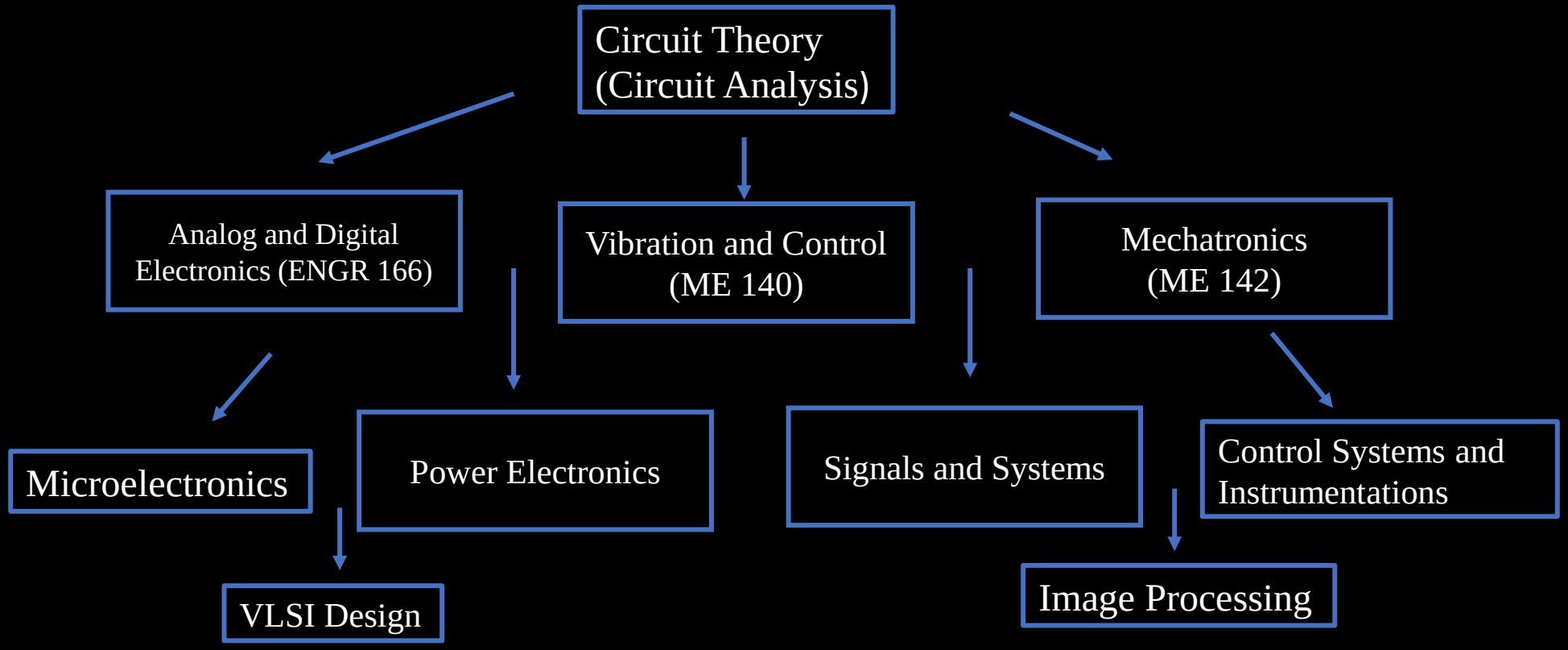
Why Do We Learn Circuit Theory?

- The circuit theory is a fundamental and core course for the related higher division courses.



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Overview of Electrical Engineering

The five major electrical systems are:

- Communication systems
- Computer systems
- Control systems
- Power systems
- Signal processing systems

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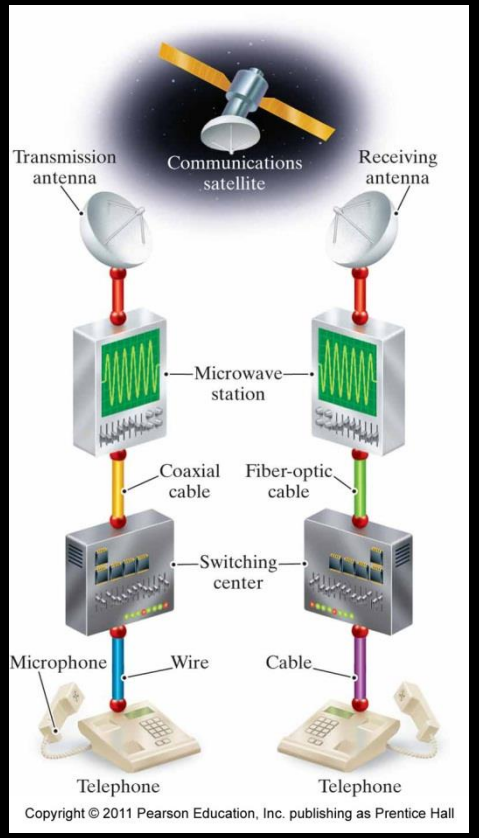
Communication System

1. Communication systems generate, transmit, and distribute information.



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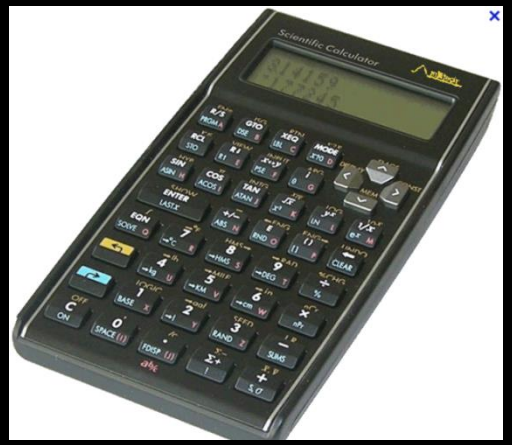
Computer Systems

2. Computer systems process information from word processing to mathematical solutions.



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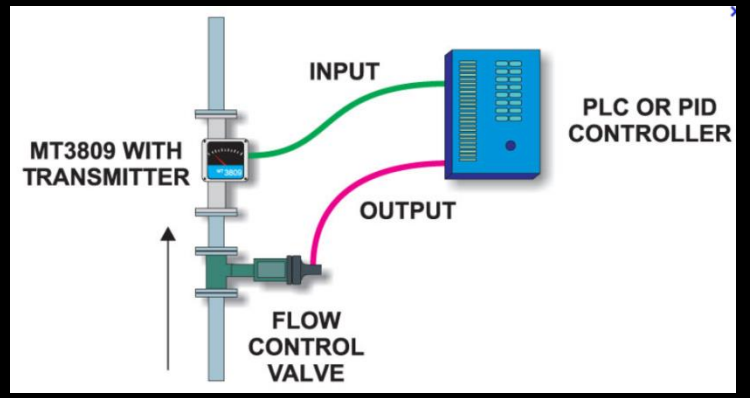
Control Systems

3. A control system can manage, direct, command, and regulate the behavior of a device or process.



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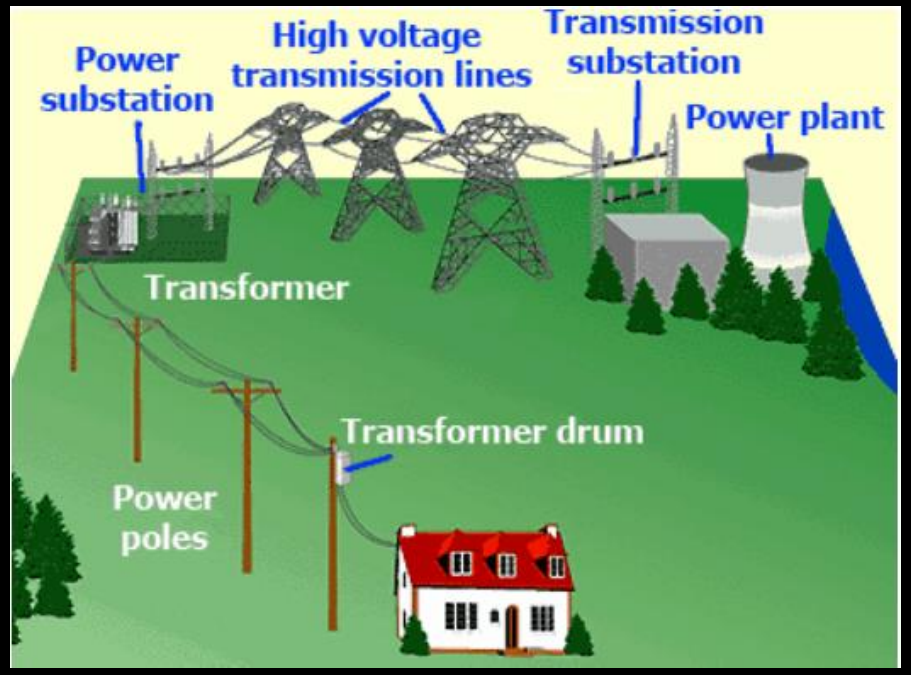
Power Systems

4. Power systems are used to generate, distribute, and use electric power.



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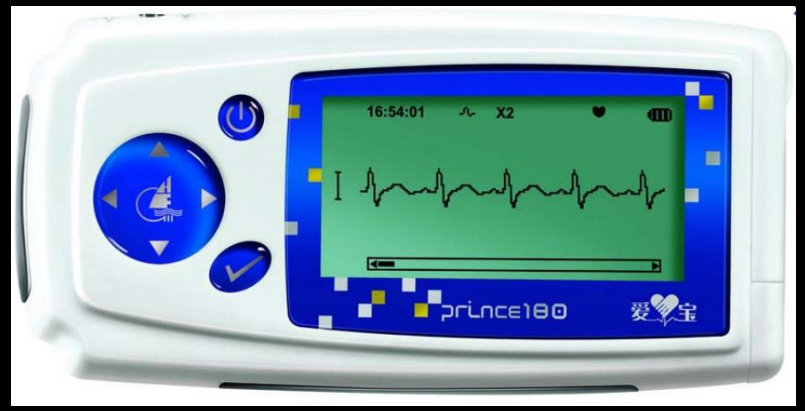
Signal Processing Systems

5. Signal processing systems use electrical signals to represent information through analyzing, modifying and converting the physical information such as sound, images and scientific measurements .



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International System of Units

TABLE 1.1 The International System of Units (SI)

Quantity	Basic Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	degree kelvin	K
Amount of substance	mole	mol
Luminous intensity	candela	cd

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International System of Units

TABLE 1.2 Derived Units in SI

Quantity	Unit Name (Symbol)	Formula
Frequency	hertz (Hz)	s^{-1}
Force	newton (N)	$kg \cdot m/s^2$
Energy or work	joule (J)	$N \cdot m$
Power	watt (W)	J/s
Electric charge	coulomb (C)	$A \cdot s$
Electric potential	volt (V)	J/C
Electric resistance	ohm (Ω)	V/A
Electric conductance	siemens (S)	A/V
Electric capacitance	farad (F)	C/V
Magnetic flux	weber (Wb)	$V \cdot s$
Inductance	henry (H)	Wb/A

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International System of Units

TABLE 1.3 Standardized Prefixes to Signify Powers of 10

Prefix	Symbol	Power
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nano	n	10^{-9}
micro	μ	10^{-6}
milli	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}
deka	da	10
hecto	h	10^{2}
kilo	k	10^{3}
mega	M	10^{6}
giga	G	10^{9}
tera	T	10^{12}

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Summary

- Introduced some examples of electrical systems.
- Went through international system of units.

In next lecture, we will discuss

- ❑Voltage, current, power, and energy
- ❑Ideal basic circuit elements
- ❑The passive sign convention
- ❑Reference polarities/directions

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Questions

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