

# Circuits

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## Overview

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SHANGHAI  
纽约大学

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# Instructor



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## Pingping DING

email: [pd79@nyu.edu](mailto:pd79@nyu.edu)

Office hours:

- Office 1156
- from 2:00 pm to 4:00 pm on Monday and Wednesday
- + extra by appointment

# Course organization



## Lectures

- Room 307
- Every Monday and Wednesday
- 9:45 am to 11:00 am

## Laboratories

- Room 711
- Every Friday
- 9:15 am to 11:05 am

Lecture times are both lectures and classwork.

Assignments :

- reading lecture slides
- homework assignment

# Course Material



## Textbook

**Engineering Circuit Analysis** by William H. Hayt, Jr., Jack E. Kemmerly, Jamie D. Phillips, and Steven M. Durbin.

Eighth edition, ninth edition.

The lecture slides are also very useful which contains everything you have to learn

# Grading



## Grading items

■ Final exam	30%
■ Midterm exam	20%
■ Homework assignments	30%
■ Lab assignments	20%

In order to succeed:

- Lectures
- Laboratories
- Personal work

**Do not hesitate to ask me questions when you don't understand !!!**

# Grading



## Grade scale

Grade	Minimum %
A	95
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70
D+	67
D	63
F	0

# Circuit analysis



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## Problem solving

**Circuit analysis** has been traditionally used as an introduction to **problem solving** for many different fields of engineering

## Analog signal

Many fields in engineering use **analog signals for an electrical circuit** in order to describe systems:

- mechanics (springs, friction, damping, ...)
- thermics
- ...



# Key concepts



## Linear circuit analysis

We will only consider **linear circuits**

*i. e.*, circuits working in linear regime (can be modelled with linear ODEs)

## Analysis

4 different categories:

- DC analysis
- transient analysis
- sinusoidal analysis
- frequency response

# Course content



## What you will learn

- nodal analysis
- mesh analysis
- superposition
- source transformation
- Thévenin/Norton's theorems
- simplification of series/parallels networks

## Components you will use

- resistor
- capacitor
- inductor
- operational amplifier

# Not only analysis



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## Also design

The **main objective** for this course is for you to learn how to **analyze** and **design** electrical linear circuits

## Definitions

- Analysis: understanding an existing system
- Design: creating a new system

# Computer-aided analysis



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## Software tools

For very complex circuits, circuit analysis can become cumbersome.  
The probability of making errors could increase.

→ Computer-aided **analysis** and **design**

Then, is it useless to learn circuits behavior?

**Definitely not!**

If an engineer does not have an idea about the expected behavior of the circuit, then it would be impossible to design a circuit from software.  
How to detect an error in parameter values for example?

# Softwares



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## SPICE: Simulation Program with Integrated Circuit Emphasis

### LTspice

Linear Technology SPICE  
link

### QUCS

Quite Universal Circuit Simulator  
link