Introduction

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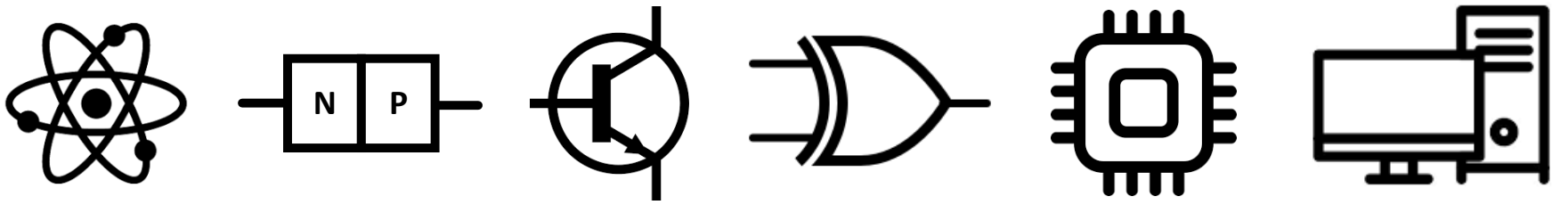
Overview

Course Position

Position



Infrastructure	Application
Complexity	Simplicity
Mathematics	Programming
Microscopic View	Macroscopic View
Slow Development	Fast Development
Specific Audience	Generic Audience

Figure: Engineering abstraction levels. From left to right, the abstraction level is intended by physicists, device engineers, electronic engineers, digital engineers, hardware engineers, and programmers.

Course Goal

Goal

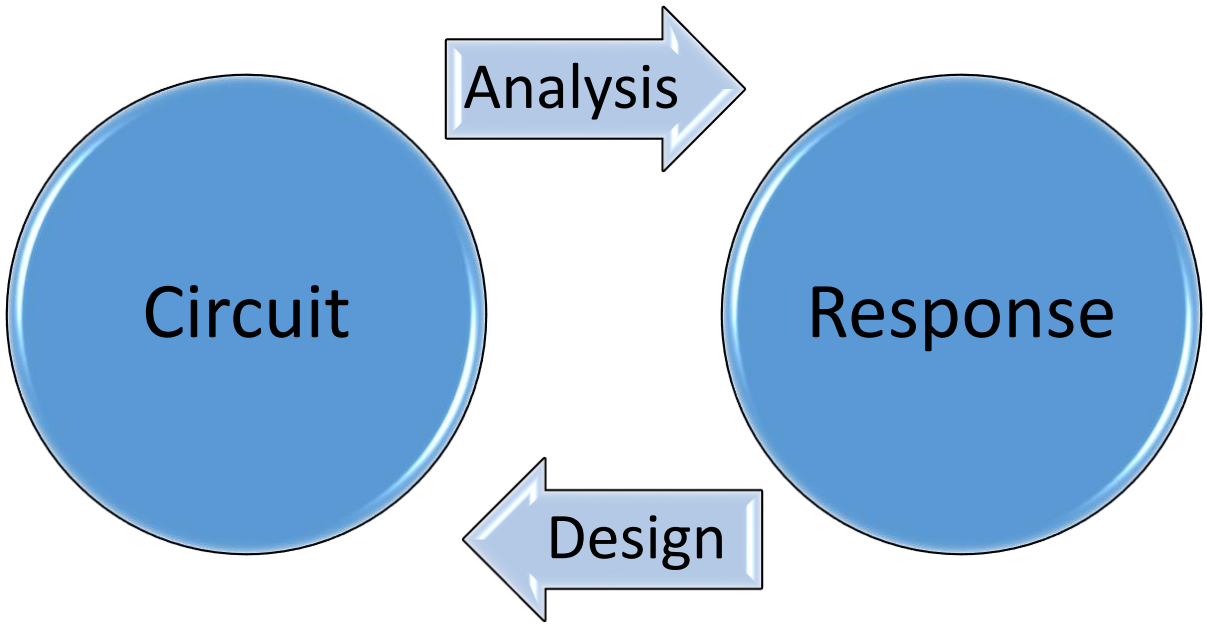


Figure: Analysis and design are reverse processes. In analysis, the response of a given circuit is determined while in design, a circuit for a desired response is proposed.

Course Approach

Approach

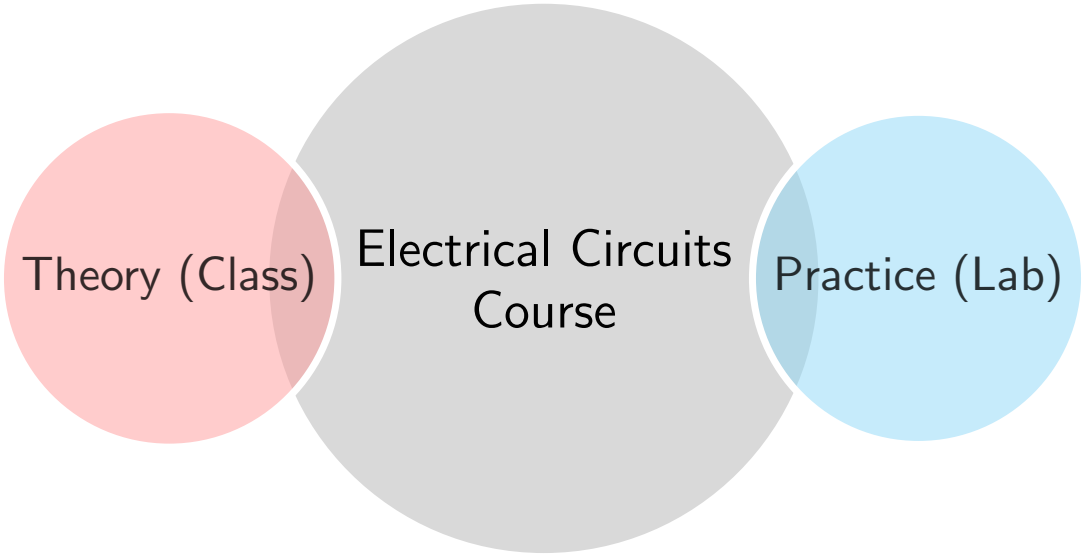


Figure: The course approach addresses theory and practice. The theory is abstracted practice and is taught in the course class while the practice is applied theory and is obtained in the course lab.

Course Coverage

Coverage

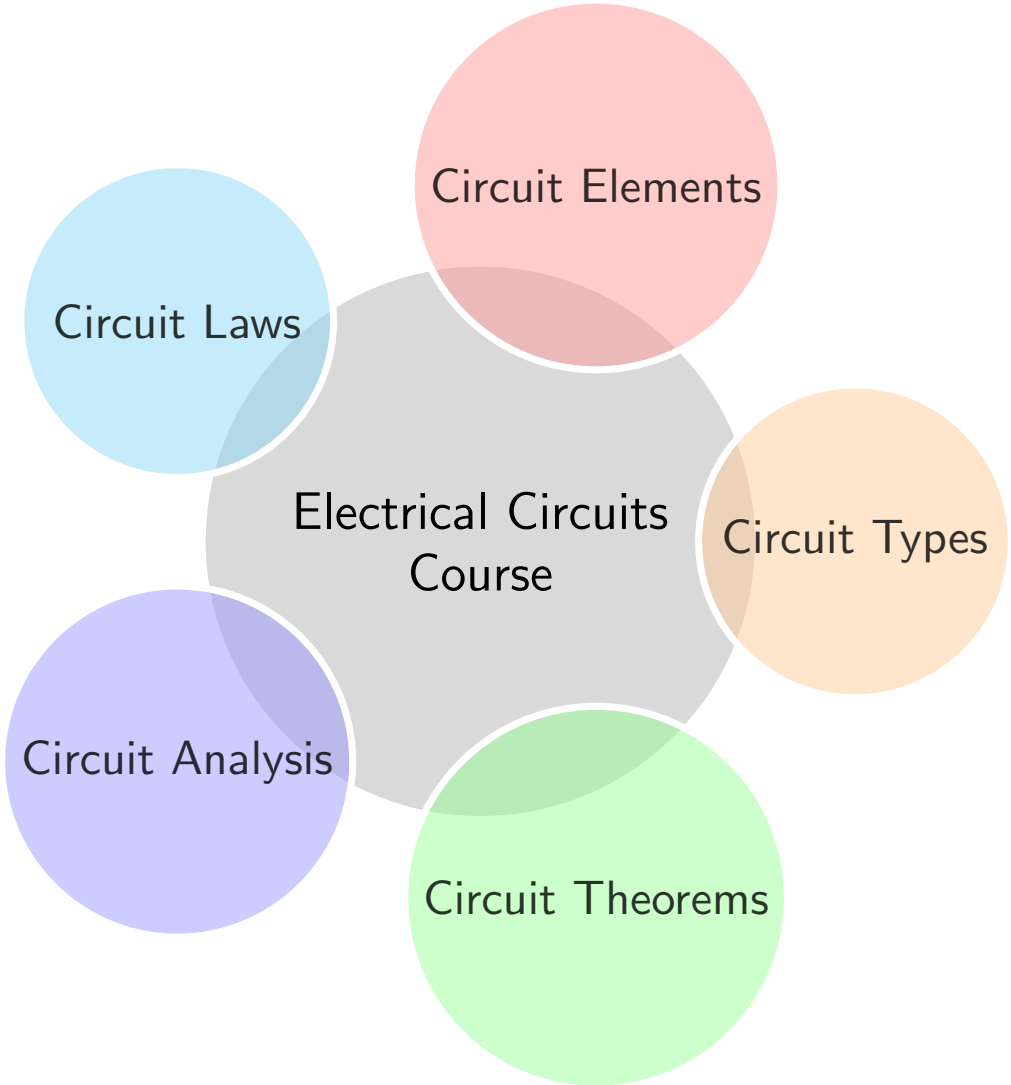


Figure: Main items covered in the course.

Coverage

1. Circuit Laws
   - Kirchhoff's Laws
2. Circuit Elements
   - Resistor, Capacitor, Inductor, and Operational Amplifier (Op-Amp)
3. Circuit Types
   - Resistive, First-order, Second-order, and Linear Time-invariant (LTI)
4. Circuit Analysis
   - Node, Mesh, and Sinusoidal Steady State
5. Circuit Theorems
   - Tellegen, Thevenin-Norton, and Superposition

Course Requirements

Requirements

1. Physics
   - Electromagnetic Theory
2. Maths
   - Linear Algebra
   - Differential Equations
   - Complex Analysis
   - Graph Theory

Course Tools

Tools

1. Simulation Tools
   - PSPICE
   - Proteus
   - CircuitLab
   - PSIM
   - MATLAB
2. Laboratory Tools
   - Sharif Function-Scope
   - Oscilloscope
   - Multi-meter
   - Function Generator
   - DC Power Supply

Course Resources

Resources

1. Online teaching on Sundays and Tuesdays, 7:30-9:00 at https://vc.sharif.edu/ch/mohammad.hadi
2. Online practicing/lab on Wednesdays, 9:00-12:00 at https://vc.sharif.edu/ch/mohammad.hadi
3. Course website at http://cw.sharif.edu
4. Class Telegram channel at https://t.me/+LVLG0eHFOKtmYzFk
5. Class Telegram group at https://t.me/+QYNmeji0yjFiNThk
6. Lab Telegram channel at https://t.me/+ewZy1wS5DxJhNDI0
7. Lab Telegram group at https://t.me/+y2uKu7P5T4FkODc8
8. Personal email to mohammad.hadi@sharif.edu
9. Telegram message to @MohammadHadiDastgerdi

Course Contents

Contents

Topics	# of Sessions
Introduction	1
Kirchhoff's Laws	1
Basic Circuit Elements	4
Simple Circuits	4
Operational Amplifiers	2
First-order Circuits	4
Second-order Circuits	3
Linear Time-invariant Circuits	2
Sinusoidal Steady state Analysis	5

Table: Topics presented in the course. The specified numbers of sessions are tentative.

Course Assessment

Assessments

Item	Frequency	Contribution	Bonus
Work Assignments	8	20%	✓
Short Quizzes	8	20%	✗
Midterm Exam	1	10%	✗
Final Exam	1	25%	✗
Oral Exam	1	10%	✗
Software Project	1	10%	✓
Class Activity	26	5%	✗

Table: Items involved in the class assessment. The specified contribution weights are tentative.

Assessments

Item	Frequency	Contribution	Bonus
Work Reports	8	40%	✓
Final Exam	1	25%	✗
Oral Exam	1	15%	✗
Lab Project	1	15%	✓
Lab Activity	8	5%	✗

Table: Items involved in the lab assessment. The specified contribution weights are tentative.

Course Assistants

Assistants

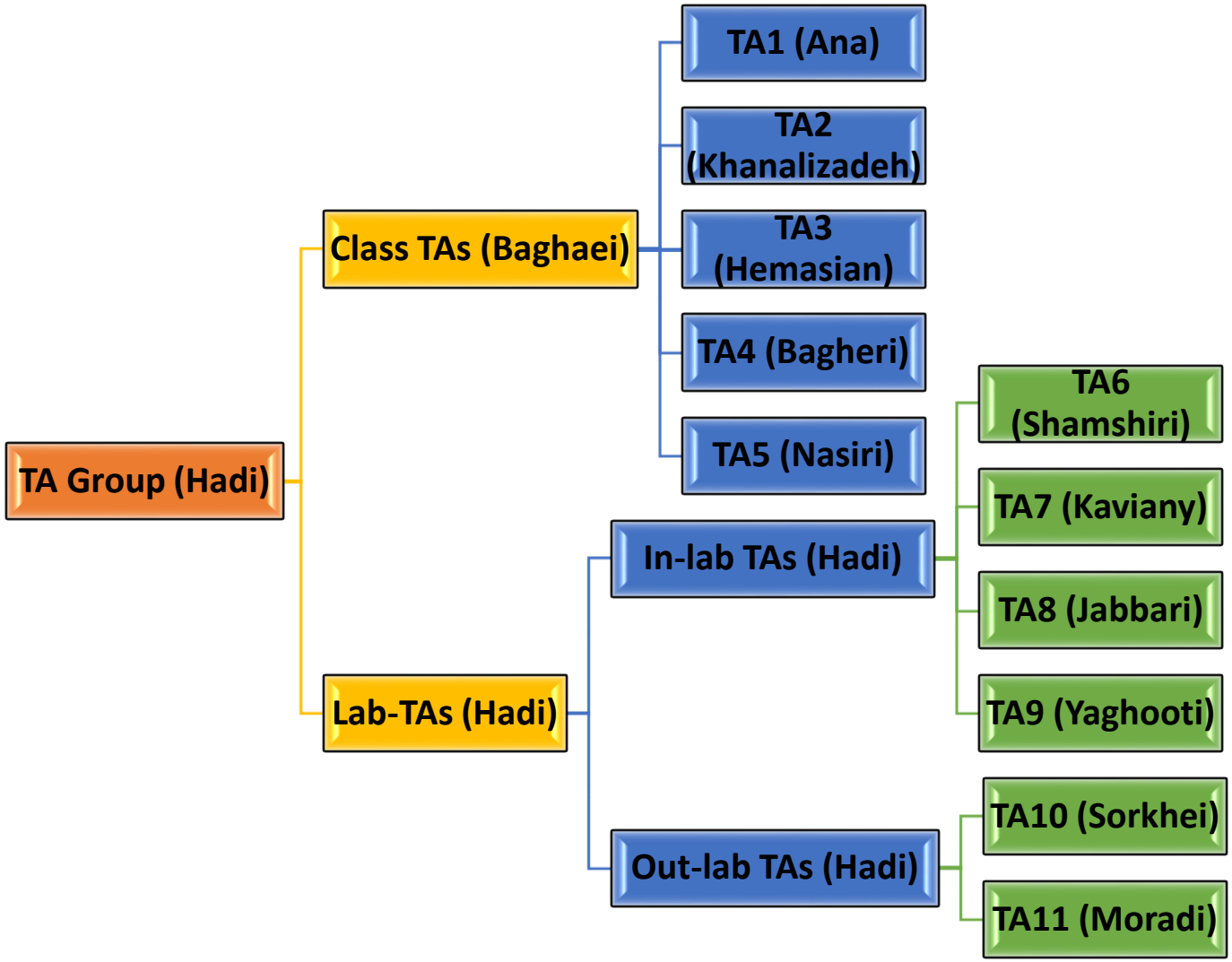


Figure: Organization of teaching assistance group.

Course References

References


Charles A. Desoer and Ernest S. Kuh (1969)
Basic Circuit Theory
McGraw-Hill Education


William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin (2012)
Engineering Circuit Analysis
McGraw-Hill Education


Robert L. Boylestad (2016)
Introductory circuit analysis
Pearson Education


J. David Irwin and Robert M. Nelms (2010)
Basic engineering circuit analysis
John Wiley & Sons

The End