East West University
Department of Computer Science and Engineering
Course Outline
Summer 2024 Semester

Course Information

Course: CSE 109/209 Electrical Circuits (Section: 1)

Teaching Scheme:

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final exam in the 14th week	2 Hours/Week for 13 Weeks	5 Hours/Week for 13 Weeks + Final exam in the 14th week

Prerequisite: None

Knowledge Profile

K1: Theory-based natural sciences
K3: Theory-based engineering fundamentals

Instructor Information

Instructor: **Dr. Sarwar Jahan**
Associate Professor, Department of Computer Science and Engineering,
East West University, Bangladesh.
Office: Room # 444
Tel. No.: 165 (ext.)
E-mail: sjahan@ewubd.edu

Class Routine and Office Hour

Day/Time	08:00-10:30	10:40-01:10	01:20-03:50	04:00-05:30
Sunday	CSE209 [LAB] SEC: 1 ROOM: 547 08:00-10:00	CSE251/ICE213 SEC: 2 ROOM: 223		
Monday	**OFFICE HOUR** **08:30-10:30**	CSE209 SEC: 1 ROOM: 113	CSE251/ICE213 SEC: 2 ROOM: 547 01:20-03:20	
Tuesday	**OFFICE HOUR** **08:30-10:30**	CSE251/ICE213 SEC: 2 ROOM: 223		
Wednesday	**OFFICE HOUR** **08:30-10:30**	CSE209 SEC: 1 ROOM: 113	CSE251/ICE213 SEC: 2 ROOM: 547 01:20-03:20	
Thursday	CSE209 [LAB] SEC: 1 ROOM: 547 08:00-10:00			

Course Objective

This course provides the students with fundamental knowledge of electrical circuits and various techniques for analyzing them. This course also provides hands-on experience in building and testing electrical circuits. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE251 Electronic Circuits, CSE 345 Digital Logic Design, CSE 350 Data Communications, CSE 360 Computer Architecture, CSE 442 Microprocessor and Microcontroller, and CSE 490 VLSI Design.

Course Outcomes (COs)

After completion of this course, students will be able to:

CO	Description	PO
CO1	**Discuss** and **use** the concepts of electrical circuit elements, circuit variables, circuit laws, and circuit combinations for solving DC and AC circuits.	PO1
CO2	**Examine** different circuit analysis techniques for DC circuit solutions.	PO2
CO3	**Examine** different circuit analysis techniques for AC circuit solutions.	PO2
CO4	**Use** analytical, software, and hardware techniques, **perform** and **demonstrate** skills, and **write** reports to design, build and test electrical circuits.	PO1

PO1: Engineering Knowledge
PO2: Problem Analysis

Course Topics, Teaching-Learning Method, and Assessment Scheme

Topic	Teaching-Learning Method	CO	Mark of Cognitive Learning Levels		Mark of COs	Exam Mark
			C2	C3		
Basic Concepts of DC circuit, charge, and current, voltage, power and energy, and Circuit elements. Ohm's Law, Kirchhoff's Voltage Law, Kirchhoff's Current Law, Series-Parallel connections, Voltage and Current Division, and Wye-delta Transformations.	Lecture, Class Discussion, Discussion with Instructor/TA	CO1	8	8	16	Midterm Exam (30)
DC Circuit Analysis: Nodal analysis (including independent and dependent sources, Super-node analysis), Mesh analysis (including independent and dependent sources, Super-mesh analysis).	Do	CO2		14	14	

DC Circuit Analysis: Superposition, Source transformation, Thevenin and Norton equivalents, Maximum power transfer.	Do	CO2		10	10	Final Exam (30)
Basic Concepts of AC circuit, Sinusoids, Phasors, Phasor relationships for Circuit Elements, Impedance and admittance. Kirchhoff's laws in Frequency domain, Impedance Combinations.	Do	CO1	5		5	
AC Circuit Analysis: Superposition, Source Transformation, Thevenin and Norton equivalents, Nodal and Mesh Analysis. Instantaneous and average power; Maximum average power transfer, Effective or RMS value, apparent power and power factor, Complex power.	Do	CO3		15	15	

Laboratory Experiments and Assessment Scheme

Experiment	CO	Mark of Cognitive Learning Level	Mark of Psychomotor Learning Levels		Mark of Affective Learning Level	CO Mark
		C3	P2	P3	A2	
Introduction to Circuit Elements and Variables	CO4					
Series DC Circuit and Verification of Kirchhoff's Voltage Laws	CO4					
Parallel DC Circuit and Verification of Kirchhoff's Current Laws	CO4					
Bias Point Detail Analysis of DC Circuit with Independent and Dependent Sources Using PSpice Schematics.	CO4					
Verification of Superposition Theorem	CO4					

Verification of Thevenin's theorem	CO4					
DC Circuit Analysis in PSpice using Source and Resistance Sweep	CO4					
Experimental Study of Sinusoids and Their Characteristics	CO4					
AC Circuit Analysis using PSpice Schematics	CO4					
Total Lab Performance by continuous evaluation in sessional format	CO4	5	1	1	1	8
Lab Exam	CO4	5	2			7
Total		**10**	**3**	**1**	**1**	**15**

Mini Project

Mini Project	CO	Mark of Cognitive Learning Level	Mark of Psychomotor Learning Levels		Mark of Affective Learning Level	CO Mark
		C3	P2	P3	A2	
Mini Project including Report and Presentation	CO4	7	1	1	1	10

C2: Understanding (cognitive) C3: Applying (cognitive) C4: Analyzing (cognitive)
P2: Manipulation (psychomotor) P3: Precision (psychomotor)
A2: Responding (affective)

Complex Engineering Problem Characteristics

EP1: Depth of knowledge required
EP2: Range of conflicting requirements

Complex Engineering Activity

None

Overall Assessment Scheme

Assessment Area	CO Marks				Total	PO Marks	
	CO1	CO2	CO3	CO4		PO1	PO2
Class Test/Quiz	6	4	5		15	6	9
Midterm Assessment	16	14			30	16	14
Final Exam	5	10	15		30	20	10
Lab Final Exam				10	10	10	
Laboratory Performance				5	5	5	
Mini Project				10	10	10	
Total	**27**	**28**	**20**	**25**	**100**	**67**	**33**

Teaching Materials/Equipment

Textbook:

1. Charles K. Alexander and Matthew N. O. Sadiku, ***Fundamentals of Electric Circuits***, 5th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

Reference book:
Robert L. Boylestad, ***Introductory Circuit Analysis***, 13th Edition, Pearson Education.

Teaching-Learning Method:
Lectures, Discussions, Lab Exercises, and post-lab assignments

Lab Manual:
Lab manuals are provided via the course website.

Mini Project Description:
Mini Project description will be provided via the course website.

Equipment/Software:
Circuit trainer board, Power supply, and PSpice Software.

Grading System

As per EWU Policy
https://www.ewubd.edu/grades-rules-and-regulations

Exam Dates

Section	Class Slot	Mid Semester	Final
1	MW	Wednesday Probable date: 31/07/2024	https://www.ewubd.edu/academic-calendar-details/summer-2024-exam-schedule

** For those who have three exams on the scheduled exam date. You have to inform the course instructor in advance to arrange the exam for you separately.*

Academic Code of Conduct

Academic Integrity

Any form of cheating, plagiarism, impersonation, or falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offense under the Academic Code of Conduct and **may lead to severe penalties up to and including suspension and expulsion.**

Special Instructions

- Students are expected to attend all classes and examinations. A student MUST have at least 80% class attendance to sit for the final exam.
- Students will not be allowed to enter the classroom after 20 minutes of the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **no make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student misses any exam, the student MUST get approval of the makeup exam by written application to the Chairperson through the Course Instructor within 24 hours of the exam time. Proper supporting documents in favor of the reason for missing the exam have to be presented with the application.
- For the final **exam**, there will be no makeup exams. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student misses the final exam, the student MUST get the approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 24 hours** of the final exam time. Proper supporting documents in favor of the reason for missing the final exam have to be presented with the application. **It is the responsibility of the student to arrange an Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor.**
- All mobile phones MUST be turned to silent mode during class and exam periods.
- There is **zero tolerance for cheating** in exams. Students caught with cheat sheets in their possession, whether used or not; writing on the palm of the hand, back of calculators, chairs or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinees, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university.**

Explanation of the levels in the Cognitive, Psychomotor, and Affective domain

Learning/Assessment Domains

Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001):

The cognitive domain involves the development of our mental skills and the acquisition of knowledge**.**

Level	Category	Meaning	Keywords
C1	Remembering	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
C2	Understanding	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
C3	Applying	Carrying out or using a procedure through executing, or implementing. *Applying* relates to or refers to situations where learned material is used through products like models, presentations, interviews, or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
C4	Analyzing	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are *differentiating, organizing, and attributing,* as well as *being able to distinguish between* the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure
C5	Evaluating	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and	Appraise, argue, assess, choose, conclude, critique, decide, evaluate,

		reports are some of the products that can be created to demonstrate the processes of evaluation.	judge, justify, predict, prioritize, prove, rank, rate, select, monitor
C6	Creating	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce

Psychomotor Domain Dave's Taxonomy 1975:

The psychomotor domain includes physical movement, coordination, and use of the motor-skill areas.

Level	Category	Meaning	Keywords
P1	Imitation	Copy the action of another; observe and replicate.	Relate, Repeat, Choose, Copy, Follow, Show, Identify, Isolate.
P2	Manipulation	Reproduce activity from instruction or memory	Copy, response, trace, Show, Start, Perform, Execute, Recreate.
P3	Precision	Execute skills reliably; independent of help.	Assemble, Implement, Organize, Calibrate, Demonstrate, Build, Perfect, Control, Complete, Measure.
P4	Articulation	Adapt and integrate expertise to satisfy a non-standard objective.	Modify, Master, Develop, Adapt, Formulate, Coordinate, Combine, Solve, Integrate.
P5	Naturalization	Automated, unconscious mastery of activity and related skills at the strategic level.	Design, Rank, Manage, Compose, Develop, Specify, Construct, Invent.

Affective Domain (Krathwohl, Bloom, Masia's Taxonomy 1973):

The affective domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasm, motivations, and attitudes.

Level	Category	Meaning	Keywords
A1	Receiving	Willingness to participate in an activity to attend to a stimulus; getting and holding the attention of students.	Locate, Give, Point to, Follow, Sit erect, Hold, Name, reply, Identify, Choose
A2	Responding	Actively participates; demonstrates interest in an object, activity, or phenomenon; seeks or pursues this object, activity, or phenomenon.	Label, Answer, Perform, Write, Conform, Assist, Recite, Report, Read, Greet, Help, Present, Compile.
A3	Valuing	Value or worth attached to an object, activity, or phenomenon; varies from simple acceptance to commitment.	Work, Form, Follow, Join, Invite, Justify, Study, Explain, Share, Propose, Select, Complete, Describe, read, report, Differentiate, Initiate.
A4	Organizing	Compare and contrast, and resolve conflict to build a consistent value system; with emphasis on comparing and synthesizing values.	Relate, Synthesize, Identify, Prepare, Defend, Generalize, Modify, Integrate, Order, Compare, Complete, Organize, Adhere, Arrange, Combine, Explain, Alter.
A5	Internalizing	Adopt a value system for a length of time that contributes to a particular "lifestyle" (i.e. directs behavior).	Influence, Propose, Use, Quality, Revise, Serve, Solve, Modify, Display, Practice, Listen, Question, Perform, Act, Discriminate, Verify

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Course Instructor