North East University Bangladesh
Department of Computer Science and Engineering

Course Outline
CSE 121 - Basic Electrical Engineering

Instructor

Shahadat Hussain Parvez

Email

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Class Schedules:

01:00 PM – 02:30 PM (B), Sunday

10:00 AM – 11:30 AM(B), Monday

11:30 AM – 01:00 PM(A), Tuesday

10:00 AM – 11:30 AM(B), Wednesday

Consultation Hours

10:00 AM – 01:00 PM, Saturday at Room 303

10:00 AM – 01:00 PM, Sunday at Room 303

Course Overview

This course is designed for the student to understand the basics of Electrical engineering. After completing this course, students should be able to understand and solve simple to complex electrical circuits using different engineering techniques. This is an introductory level course and has no prerequisite course.

Text Book

- Fundamentals of Electric circuit by Charles K. Alexander and Mathew N.O. Sadiku, 3rd edition (Alexander)

Reference Books

- Introductory Circuit Analysis by Robert L. Boylestad, 11th edition (Boylestad)
- Electric Circuits by James W. Nilsson and Susan A. Riedel, 9th Edition (Nilsson)
- Electrical and Electronic Principles and Technology by John Bird (Bird)
- Fundamental of Electrical and Electronic Principles by Christopher R Robertson (Robertson)

Course Materials

All the course materials (Including name for any new books) will be available at

- http://www.neub.shparvez.net/cse-121/
- http://www.neub.shparvez.net/cse-122/

Course Learning Outcomes

The intended learning outcomes from this course are as follows

- To be able to identify the essence of Electrical Engineering.
- To be able to understand the basic concepts of AC and DC circuits.
- To be able to solve complex and simple resistive circuits with different circuit solving techniques like KCL, KVL, CDR, VDR, Nodal analysis, Mesh analysis, etc.
- To be able to convert Practical electrical circuits to circuit diagrams.
- To be able to convert complex circuits to simpler ones.
- To be able to create equivalent circuit models.
- To be able to understand the basics of energy storage elements like capacitors and inductors.
- To be able to solve circuits involving capacitors and inductors.
- To be able to solve circuits involving AC and DC sources.
- To be able to Analyze power in AC circuits

Course Schedule

Week	Topic to be Covered	Learning Outcomes
Week 1	Lecture 1: Introduction to Electrical Engineering • Introduction to Electrical Engineering • Units of measurements • Introduction to Circuit theories • Alternating and Direct current • Circuit Elements • Ohm's Law **Reading Lists:** • Alexander Chapter 1 • Alexander Chapter 2, section 2.1 – 2.3 • Boylestad Chapter 1	Student should be able to • Understand about what Electrical Engineering is about. • Understand about the different units used in science and engineering. • Understand the basics of circuit theory and identify different circuit elements. • Understand clearly ohm's law
Week 2	Lecture 2: Basic Laws in Electrical Circuits • Kirchhoff's Current Law • Kirchhoff's Voltage Law • Series Resistors and Voltage Division • Parallel Resistors and Current Division • Wye-Delta Transformation (Y-Δ) **Reading Lists:** • Alexander Chapter 2, Section 2.4 – 2.7	Student should be able to • Understand and grasp basic laws in Electrical circuits like KCL, KVL, CDR, VDR etc. • Understand the basics of Y-Δ transformation
Week 3	Lecture 3: Techniques of circuit analysis • Nodal Analysis • Super-node analysis **Reading Lists:** • Alexander Chapter 3, 3.1 – 3.3 • Boylestad Chapter 8, section 8.9 - 8.10	Student should be able to • Understand different higher-level circuit solving techniques like nodal analysis and super-node analysis and able to solve different circuits using these techniques.
Week 4	Lecture 3: Techniques of circuit analysis • Mesh Analysis • Super-mesh analysis Lecture 4: Circuit Theorems • Linearity Property • Superposition Theorem • Source Transformation **Reading Lists:** • Alexander Chapter 3, section 3.4 – 3.7 • Alexander Chapter 4, section 4.1 – 4.4 • Boylestad Chapter 8, Section 8.5 – 8.8	Student should be able to • Understand different higher-level circuit solving techniques like mesh analysis and super-mesh analysis and able to solve different circuits using these techniques. • Understand different circuit theorems like linearity, superposition and source transformation theorems.

Week	Topic to be Covered	Learning Outcomes
Week 5	Lecture 4: Circuit Theorems • Thevenin's Theorem • Norton's Theorem • Maximum Power Transfer theorem • Reciprocity Theorem **Reading Lists:** • Alexander Chapter 4, section 4.5 – 4.8 • Boylestad Chapter 9, Section 9.3, 9.4, 9.5, 9.8 **Tutorial 1** **Topic:** Lecture 2 and Lecture 3	Student should be able to • Understand different circuit theorems like Thevenin's, Norton's, maximum power transfer, reciprocity theorems.
Week 6	Revision and Solve Class	
Week 7	Lecture 5: Energy Storage Elements • Capacitors • Series and Parallel capacitors • Inductors • Series and parallel inductors **Reading Lists:** • Alexander Chapter 6, section 6.1 – 6.5	Student should be able to • Understand the basics of energy storage elements like capacitors and inductors. • Find the equivalent capacitance and inductance for different series parallel configuration.
Week 8	Lecture 6: First Order Circuits • Source free RC circuit [Natural Response] • Source free RL circuit [Natural response] • Singularity functions • Step Response of an RC circuit • Step Response of an RL circuit **Reading Lists:** • Alexander Chapter 7	Student should be able to • Understand the mathematical and physical model of different singularity functions like unit step, impulse and ramp functions. • Understand and solve natural and step response of first order circuits like RC and RL circuits.
Week 9	Lecture 7: Introduction to Alternating Current • Sinusoids • Phasors • Phasor relationships for circuit elements • Impedance and admittance **Reading Lists:** • Alexander Chapter 9 • Boylestad Chapter 13 • Boylestad Chapter 14	Student should be able to • Understand the basics of Sinusoids and their representation. • Understand basics of phasor algebra and phasor relationship of different circuit elements like resistors, capacitors and inductors.

Week	Topic to be Covered	Learning Outcomes
Week 10	Lecture 8: AC Power Analysis • Instantaneous and Average Power • Maximum Average Power Transfer • Effective or RMS Value • Apparent Power and Power Factor • Complex Power **Reading Lists:** • Alexander Chapter 11 • Boylestad Chapter 19	Student should be able to • Understand the difference between instantaneous and average power. • Identify the conditions for maximum power transfer. • Understand the importance of RMS value • Understand and differentiate between Apparent power, Complex power and their relationship with power factor.
Week 11	Lecture 9: Practical circuits • Different practical circuits and their configuration • Practical AC circuit wiring **Tutorial 2** **Topic:** Lecture 6 and Lecture 7	Student should be able to • Understand how different practical circuits are connected.
Week 12	Revision and Solve Class	

Assignments

Assignment	Topic	Due Date
Assignment 1	Questions from Lecture 1, 2,3	Last Class before midterm
Assignment 2	Questions from Lecture 5, 6, 7	Last class day of the semester

Assignment Policy

Assignments Must be submitted within due dates. No excuse or requests will be considered regarding late submission.

Grading Policy

Attendance	: 10 marks
Tutorial	: 15 marks
Assignment	: 5 marks
Mid Semester Examination	: 30 marks
Semester Final Examination	: 40 marks

Grades and grades point will be based on the following criteria.

Marks Range	Letter Grade	Grade Point
80% and Above	A+	4.00
75% - 79%	A	3.75
70% - 74%	A-	3.50
65% - 69%	B+	3.25
60% - 64%	B	3.00
55% - 59%	B-	2.75
50% - 54%	C+	2.50
45% - 49%	C	2.25
40% - 44%	D	2.00
Less than 40%	F	0.00

Exam Schedule

Exam	Schedule
Tutorial Exam #1	3rd Week of October (Probable date 17th October 2019)
Mid Semester Examination	Announced by the Controller of Examination Office
Tutorial Exam #2	1st Week of December (Probable date 5th December 2019)
Semester Final Examination	Announced by the Controller of Examination Office

Attendance Policy

Attendance will be taken based on the following criteria:

- Students who are on time will get full attendance without any penalty.
- Students who are no more than 30 minutes late will get 50% attendance penalty (Meaning half of the attendance will be accounted).
- Students who are more than 30 minutes late will get 90% attendance penalty.

Mark for attendance will be awarded as follows.

Level of Attendance	Mark
96% to 100%	10
91% to 95%	9
86% to 90%	8
81% to 85%	7
76% to 80%	6

Level of Attendance	Mark
71% to 75%	5
66% to 70%	4
61% to 65%	3
60%	2
Below 60%	0

Other policies

Bunking of class will be severely penalized. Mass bunking during tutorials will result in zero marks for all students. Other than bunking, unusual distractions during lectures by any students will also be severely penalized.