2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Engineering Basics Lab
Course Code:	EE1231
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	V5
Last Revision Date:	01-01-2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3rd level, 2nd year)					
4. Course general Description:					
This laboratory course introduces students to foundational electrical engineering tools and techniques through simulation, measurement, and data analysis. Students will explore circuit laws and theorems using PSpice, engage in physical measurements and control systems using LabVIEW, and develop fundamental programming skills in MATLAB. The course also emphasizes engineering ethics and the societal, environmental, and global impact of engineering practices.					
5. Pre-requirements for this course (if any)**:**					
PHYS1118, PHYS1120					
6. Co-requisites for this course (if any)**:**					

7. Course Main Objective(s):

Verification of Circuit Laws and Theorems

- Hands-on and simulation-based validation using PSpice
- Ohm's Law, KVL, KCL, Thevenin and Norton equivalents
- Emphasis on data accuracy and reporting with integrity

Ethical Use of Simulation Tools

- Discussion: Ethical implications of simulation vs. real-world testing
- Case Study: Engineering failures due to simulation-only validation

Measurement and Control Systems with LabVIEW

- Measurement of temperature, voltage, current, and other physical parameters
- Implementation of basic control systems
- Safety and ethical considerations in automated systems

MATLAB for Engineering Problem Solving

- Variables, operations, and matrices
- Built-in functions, custom functions (M-files)
- Plotting and data visualization
- Programming structures: loops, conditionals, error handling
- Analyzing system responses under various societal/environmental conditions

Engineering Ethics and Global Impact

- Reflection assignment: Societal impact of electrical systems (e.g., energy consumption, smart grid, automation)
- Group discussion: Role of engineers in sustainable development
- Mini-project: Designing a low-power or socially beneficial system, considering environmental/economic impacts

Professional Responsibilities in the Lab Environment

- Lab notebook management and accurate reporting
- Teamwork, communication, and accountability
- Discussions on plagiarism, data fabrication, and peer collaboration

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	-
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-

Total	30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
K1	Apply basic circuit laws and theorems using simulation tools (PSpice) and interpret their practical implications in engineering systems.	1.4	Guidance & Support based project/Lab	As Approved by Department
2.0	**Skills**			
S1	Use engineering tools (PSpice, MATLAB, LabVIEW) to solve problems and optimize designs relevant to real-world electrical engineering applications.	2.3	Guidance & Support based project/Lab	As Approved by Department
S2	Utilize MATLAB and LabVIEW to model, analyze, and control engineering systems and present results in visual formats (graphs/tables).	6.6	Guidance & Support based project/Lab	As Approved by Department
3.0	**Values, autonomy, and responsibility**			
V2	Analyze how engineering solutions can affect global, environmental, and societal contexts through lab-based examples and case studies.	4.2	Guidance & Support based project/Lab	As Approved by Department

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
V2	Collaborate effectively in teams and document lab work in a professional manner, recognizing ethical and professional responsibilities in engineering decisions.	4.3	Guidance & Support based project/Lab	As Approved by Department

C. Course Content

No	List of Topics	Tools	ABET SO Focus	Contact Hours
1.	Lab Orientation, Safety, and Engineering Ethics Intro	--	SO 4	**2**
2.	Introduction to PSpice: Resistor Networks, Ohm's Law, KVL, KCL	PSpice	SO 1, SO 6	**2**
3.	Thevenin and Norton Theorems via Simulation	PSpice	SO 1, SO 6	**2**
4.	Transient Analysis of RC and RL Circuits	PSpice	SO 1, SO 6	**2**
5.	Introduction to MATLAB: Basic Syntax, Variables, Arrays, and Plotting	MATLAB	SO 1	**2**
6.	MATLAB: Matrix Operations and Built-in Functions	MATLAB	SO 1	**2**
7.	MATLAB: Conditional Statements, Loops, and Custom M-files	MATLAB	SO 1, SO 2	**2**
8.	MATLAB: Data Visualization, Graphing Results, Error Analysis	MATLAB	SO 6	**2**
9.	Introduction to LabVIEW: Interface, Virtual Instruments, Basic Data Acquisition	LabVIEW	SO 1, SO 6	**2**
10.	LabVIEW: Measuring Physical Parameters (e.g., Temperature, Voltage)	LabVIEW + sensors	SO 1, SO 2, SO 6	**2**
11.	LabVIEW: Simple Control Systems and Automation Example	LabVIEW + control output	SO 2	**2**
12.	Case Study Discussion: Engineering Failure & Ethical Implications	--	SO 4	**2**
13.	Mini-Project Planning: Select a small simulation/control task with global/societal relevance	All tools	SO 2, SO 4, SO 6	**2**
14.	Mini-Project Execution + Peer Review on Societal/Environmental Impact	All tools	SO 4	**2**
15.	Mini-Project Presentations + Final Reflections on Ethical/Professional Responsibility in Engg.	All tools	SO 4	**2**
Total				**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment Frequency	Percentage of Total Assessment Score
1.	In-lab sessions	10	70%
2.	Projects	3	30%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Lab Manual as provided by Department. 2. Getting started with MATLAB by Rudra Pratap, Oxford University press.
Supportive References	
Electronic Materials	Online Tutorials & resources
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Required PSpice Installations (Anywhere)**
Technology equipment (projector, smart board, software)	**Required Data show in SR 137**
Other equipment (depending on the nature of the specialty)	**Chairs of 15 Persons if SR 137 is used as Lab.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Students	Indirect
Quality of learning resources	Relevant Focus Group	Indirect
The extent to which CLOs have been achieved	Dept. Quality Committee	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	