هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Engineering Mathematics
Course Code:	202-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th/3rd)					
4. Course general Description:					
Vector analysis including vector fields, gradient, divergence, curl, line and surface integrals, Gauss' and Stokes' theorems. Introduction to complex variables, eigenvalues and eigenvectors. Commonly used engineering functions, series and sequences.					
5. Pre-requirements for this course (if any):					
Advanced Calculus (203-MATH-3)					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Understand the definitions of Vector Space and its linear Independence 2. Solve Eigen value problems and apply Cayley Hamilton Theorem. 3. Study Curl and divergence with their applications. 4. Derive mathematical models of physical systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify, formulate, and solve engineering problems using mathematical theorem.	1	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes Final exam
1.2	Apply knowledge of engineering mathematics to analyze the electrical systems.	7	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 1 Final exam
1.3				
2.0	**Skills**			
2.1	Solving electrical engineering applications by using mathematical theorem.	6	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 2 Final exam
2.2				
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	**Complex numbers** Phasor rotation by $\pi/2$ Complex numbers and operations Solution of quadratic equations Polar form of a complex number Applications of complex numbers to AC linear circuits The importance of being exponential	15
2.	**Vectors** Vectors and vector quantities Addition and subtraction of vectors Magnitude and direction of a 2D vector – polar coordinates Application of vectors to represent waves phasors) Multiplication of a vector by a scalar and unit vectors Basis vectors Products of vectors Vector equation of a line	15
3.	**Vector calculus** The gradient of a scalar field Differentiating vector fields The scalar line integral Surface integrals	15
4.	**Systems of linear equations, matrices, and determinants** Matrices Systems of Equations Gauss elimination The inverse and determinant of a 3×3 matrix	15
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.			
6.			

*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	Advanced Engineering Mathematics by P. O'Neil, International Student Edition. 2011
Supportive References	Mathematics for Electrical Engineering and Computing by Mary Attenborough, 2003
Electronic Materials	None
Other Learning Materials	Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Computer Programming for Engineers
Course Code:	204-GEC-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 4
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th/2nd)					
4. Course general Description:					
Computer Algorithms; Developing Algorithms; Programming Preliminaries; Simple computer Programs; Numeric Constants and Variables; Arithmetic Expressions; Input and Output in C Programs; Conditional statements; Implementing loops in Programs; Defining and Manipulation Arrays; Logical Expressions and More Control statements; C Programs Examples; Functions; Enumerated data Type and stacks; Structures; Pointer Data Type and its Applications; Lists and Trees; Recursion; Bit level Operations and Applications; Files in C; Miscellaneous Features of C.					
5. Pre-requirements for this course (if any)**:**					
101-CIS-2					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. **Understand the basic computer programming concepts.** 2. Programming some examples with C language					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify the Basic Structure and syntaxes of Programming languages.	1	Lectures and lab work	Theoretical exams, practical Exams, Quizzes
1.2	Distinguish different data types.	1	Lectures and lab work	Theoretical exams, practical Exams, Quizzes
1.3				
2.0	**Skills**			
2.1	Develop Computer Algorithms.	6	Lectures and lab work	Theoretical exams, practical Exams, Quizzes
2.2	Apply C programming language in solving mathematical, physical and engineering problems.	6	Lectures and lab work	Theoretical exams, practical Exams, Quizzes
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours

1.	Introduction to programming languages	4
2.	Input and output in C language.	12
3.	Studying the syntaxes of C language.	8
4.	Sequential, selection and repetitive structures of C language.	14
5.	Arithmetic and mathematical expressions.	8
6.	Functions, arrays and pointer.	14
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	10	20
2.	Quiz 1	7	5
3.	Quiz 2	12	5
4.	Lab work	Weekly	20
5.	Final exam	At the end of the semester as determined by the academic calendar	50

*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	"Computer Programming in C," by V. RAJARAMAN Eastern Economy Edition.
Supportive References	"Problem Solving and Program Design in C," Jeri R. Hanly & Elliot B. Koffman, Seventh Ed., Pearson, 2013 Other supplemental materials "C "How to Program," P. J. Deitel & H. M. Deitel, Sixth Ed., Pearson, 2010
Electronic Materials	http://lib.nu.edu.sa/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom and lab

Items	Resources
Technology equipment (projector, smart board, software)	Data show, Smart Board, Internet access, Software
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/03/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Circuits Lab
Course Code:	213-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th/3rd)					
4. Course general Description:					
In this course students will perform experiments to verify practically the theories and concepts learned in 216EE-3 and 217EE-3. This lab course introduces circuit using Ohm's law, KVL, KCL, Superposition, Thevenin's and Maximum power transfer theorems in DC circuits. Topics include also AC circuits, resonant circuits, transient response of 1st order circuits, magnetically coupled circuits and three phase circuits.					
5. Pre-requirements for this course (if any)**:**					
NA					
6. Co-requisites for this course (if any)**:**					
217-ELE-3 Electrical Circuits (2)					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Recognize electrical laboratory devices. 2. Recognize and analyze of Electric Circuits using Fundamental laws: Ohm's law, Kirchhoff voltage law (KVL) and Kirchhoff current law (KCL). 3. Analyze of basic series, parallel and series-parallel Circuits. 4. Describe and analyze Electric Circuits using superposition, Thevenin, and maximum power transfer theorems. 5. Categorize the response of various types of resonant circuits. 6. Analyze Response of Transient Response of 1st Order Circuits. 7. Making use of the equipment's and techniques in the laboratory to translate the theory into reality.					

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		

No	Mode of Instruction	Contact Hours	Percentage
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**			
1.1	Recognize electrical laboratory devices	1	- Pre-lab lectures - Experiment	- Reports - Pre-labs - Lab Performance - Mid Term Exam - Final Exam
1.2				
1.3				
2.0	**Skills**			
2.1	Verify Ohm's and Kirchhoff's laws.	6	- Pre-lab lectures - Experiment	- Reports - Pre-labs - Lab Performance - Mid Term Exam Final Exam
2.2	Apply Superposition, Thevenin and Maximum power transfer theorems.	6	- Pre-lab lectures - Experiment	- Reports - Pre-labs - Lab Performance

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				- Mid Term Exam Final Exam
2.3	Estimate experimentally the resonance frequency of series and parallel AC circuits.	6	- Pre-lab lectures - Experiment	- Reports - Pre-labs - Lab Performance - Mid Term Exam Final Exam
2.4	Examine the transient response.	6	- Pre-lab lectures - Experiment	- Reports - Pre-labs - Lab Performance - Mid Term Exam Final Exam
2.5	Communicate effectively in group discussion and oral examination.	3	- Experiment	- Lab Performance and oral examination Reports
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Experiment	- Reports
3.2	Work effectively as a member of the team.	5	- Experiment	Lab Performance and oral examination
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Resistor Color Code	2
2.	Ohm s Law, Series and parallel DC circuit (KVL & KCL)	2
3.	Series-Parallel DC Circuits	2
4.	Superposition Theorem	2
5.	Maximum Power Transfer Theorem	2
6.	(RC) Low pass and High pass filters	4
7.	Resonant (RLC) band pass and band stop filters	4
8.	Two-port Network	4

9.	Transients in DC Circuits	4
10.	Op-Amp (inverting & non inverting)	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Reports	Every experiment	10%
2.	Pre-lab Quiz	Every experiment	10%
3.	Lab Performance	Every experiment	10%
4.	Mid Term Exam	8	20%
5.	Final Exam	End of the semester	50%
6.			

*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	Boylestad , "Introductory Circuit Analysis" , Twelfth EDITION, Pearson Prentice Hall.
Supportive References	James W. Nilsson and Susan A. Riedel, "Electric Circuits", EIGHTH EDITION, Pearson Prentice Hall.
Electronic Materials	Fundamentals of Electric Circuits by C. D. Alexander and M. N. O. Sadiku, third Edition, Mc Graw-Hill Education, 2007.
Other Learning Materials	http://lib.nu.edu.sa/digitallibbrary.aspx

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Instrumentation and Measurements
Course Code:	214-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
Measurement fundamentals: units and errors, statistical analysis: DC and AC analog digital meters constructions :DC and AC bridge : Oscilloscope: CRT, trigger sweep circuits: Oscilloscopes, Analog and Digital Multi meters to measure electrical parameters: Transducers and sensors; passive and active : specifications of Spectrum analyzer, Liquid crystal displays (LCDs) and optical fiber sensor.					
5. Pre-requirements for this course (if any)**:**					
216-ELE-3 Electrical Circuit (1)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Define and classify units and errors. 2. Explain the principle work of analog and digital meters 3. Recognize and explain DC / AC bridge and oscilloscope used in measurement systems. 4. Use the Oscilloscopes, bridge , Analog and Digital Multi meters to measure electrical parameters 5. Classify and explain the sensors and transducer.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		45

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**			
1.1	Define and classify units and errors	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2	Identify the working principle of analog and digital meters	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.3	Recognize and explain DC / AC bridge and oscilloscope used in measurement systems	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
1.4	Classify the sensors and transducers	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.0	**Skills**			
2.1	Use the Oscilloscopes, bridges, Analog and Digital Multimeters to measure electrical parameters	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.2				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Measurements fundamentals: Basic and general terms in metrology, Units and standards, errors, Methods of measurements, statistical analysis.	09
2.	Analogue meters: DC and Ac meters, loading effect and insertion effect.	09
3.	Digital measurements: Data conversion principles, A/D conversion, D/A conversion, digital voltmeter, grounding, shielding and noise.	06
4.	Difference and instrumentation DC/AC bridge ; Oscilloscopes circuits.	09
5.	Characteristics and analysis of Sensors and Transducers types	12
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

*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	Electrical Measurements and measuring instruments by A. K. Sawhney, 2010
Supportive References	Measurement and Instrumentation Principles, by Alan.s.Moris , Butterworth-Heinemann (2001)
Electronic Materials	NA
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Instrumentation and Measurements Lab
Course Code:	215-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
Measurement fundamentals: units and errors, statistical analysis: DC current and voltage measurement, Use of Oscilloscope, Use of bridge circuit.					
5. Pre-requirements for this course (if any):					
NA					
6. Co-requisites for this course (if any):					
214-ELE-3 Instrumentation and Measurements					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. To learn fundamentals of the instrumentation and measurements. 2. To be familiar with basic terms used in electrical measurements					

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**			
1.1	Identify the errors in measurements and do the statistical analysis	1	- Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Conduct experiment to measure DC voltages and current through the circuit.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.2	Conduct experiments to measure amplitude, frequency and phase angle using oscilloscope.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.3	Use different techniques to measure resistance using DC Bridge circuits.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.4	Use techniques to measure the temperature of the tank using thermocouple sensor.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Communicate effectively in group discussion.	3	Lab demonstration	- Lab Report Oral Examination
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively as a member of the team.	5	Lab demonstration	Lab Report
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Experiment	- Reports
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Investigate sources of error in measurements and to observe the value of statistical analysis.	8
2.	Measurement of DC voltages and current through the circuit.	4
3.	Study and learn how to use multi-meter properly.	2
4.	Using oscilloscope properly and to measure amplitude, frequency and phase angle by using oscilloscope.	6
5.	Study of resistance measurement techniques using DC Bridge circuits	4
6.	Study and measure the temperature of the tank using thermocouple sensor	6
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 7	20 %
2.	Quizzes	Every lab	10 %
3.	Lab Report	Every lab	20 %
4.	Final Exam	At the end of the semester as determined by the	50 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
		academic calendar	

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

E. Learning Resources and Facilities

1. References and Learning Resources

Es2.5sential References	Electrical Measurements and measuring instruments by A. K. Sawhney, 2010
Supportive References	Measurement and Instrumentation Principles, by Alan.s.Moris , Butterworth-Heinemann (2001)
Electronic Materials	Lab notes are delivered to the students through online portal "Blackboard"
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab for maximum 10 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Circuits (1)
Course Code:	216-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: ($4^{th}/2^{nd}$)					
4. Course general Description:					
Basic circuit elements and concepts; Basic laws of circuit theory: Ohm's law, Kirchhoff's law; Circuit theorems: superposition principle, Thevenin and Norton theorems; maximum power transfer theorem Techniques of circuit analysis: Nodal and mesh analysis; Sinusoidal sources and the concept of phasor in circuit analysis; Introduction to concept of active, reactive, complex power and power factor.					
5. Pre-requirements for this course (if any)**:**					
106-MAT-3 and 105-PHY-3					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					

After completing this course the students should be able to:

1. Explain basic circuit elements and concepts.
2. Explain basic laws of circuit theory.
3. Analyze series/parallel DC circuits using Ohm's and Kirchhoff's laws.
4. Analyze DC circuits using mesh and Nodal methods.
5. Analyze circuits using Thevenin's, Norton's, superposition, and maximum power transfer theorems.
6. Analyze AC circuits.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify and analyze Series/Parallel DC Circuits using Ohm's and Kirchhoff's Laws.	1	- Lectures - Tutorials	- Quizzes - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze DC Circuits using Mesh and Nodal Methods of Analysis	6	- Lectures - Tutorials	- Quizzes - Test 1 Final exam
2.2	Analyze DC Circuits using Superposition, Thevenin's, Norton's and Maximum power transfer Theorems.	6	- Lectures - Tutorials	- Quizzes - Test 2 Final exam
2.3	Analyze AC Circuits	6	- Lectures - Tutorials	- Quizzes - Test 2 Final exam
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Current, voltage and resistance.	4
2.	Ohm's law, power and energy calculations.	4
3.	Kirchhoff's current and voltage laws in series/parallel DC circuit analysis.	8
4.	Mesh, nodal analysis and source transformation.	12
5.	Superposition, Thevenin, Norton and maximum power transfer theorems.	12
6.	Sinusoidal Alternating Waveforms and phasor representation.	8
7.	Series, Parallel and Series/Parallel AC circuits	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Quizzes	At the completion of every CLO	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Boylestad, "Introductory Circuit Analysis", Twelfth Edition, Pearson Prentice Hall. 2010.
Supportive References	• James W. Nilsson and Susan A. Riedel, "Electric Circuits", EIGHTH EDITION, Pearson Prentice Hall. Fundamentals of Electric Circuits by C. D. Alexander and M. N. O. Sadiku, third Edition, Mc Graw-Hill Education, 2007.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx www. en.wikipedia.org/wiki/Electrical_network www. allaboutcircuits.com
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for a maximum of 15 students
Technology equipment (projector, smart board, software)	Classroom with adequate daylight equipped with data projector, separated from white board.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Electrical Circuits (2)
Course Code:	217-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th/3rd)					
4. Course general Description:					
Time domain transient responses for first and second order circuits, Resonance in Series and parallel AC circuits, Frequency domain analysis: bode plots and passive filters, Magnetically coupled circuits, Two port networks, Analysis of three-phase circuits with balanced conditions.					
5. Pre-requirements for this course (if any)**:**					
Electrical Circuits (1) (216-ELE-3)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Analyze Response of First and Second-Order transient circuits. 2. Categorize the response of various types of resonant circuits. 3. Analyze low-pass, high-pass, band-pass, and stop-band filter circuits. 4. Recognize and analyze two-port networks. 5. Describe and analyze transformers. 6. Analyze balanced three-phase circuits applying single-phase equivalent circuits. **7.** Make use of circuit analytical methods and techniques in electronic circuit analysis.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify the circuits containing magnetically coupled coils.	1	- Lectures - Tutorials	- Quizzes - Test 2 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze RL, RC and RLC circuits to determine transient response	6	-Lectures - Tutorials	- Quizzes - Test 1 Final exam
2.2	Design of low-pass, high-pass, band-pass, and stop-band filter circuits.	2	-Lectures - Tutorials	- Mini project - Quizzes - Test 1 Final exam
2.3	Analyze circuits consisting of two-port networks	6	-Lectures - Tutorials	- Quizzes - Test 2 Final exam
2.4	Analyze balanced three-phase circuits applying single-phase equivalent circuit.	6	-Lectures - Tutorials	- Quizzes - Test 2 Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	-Lectures - Tutorials	- Mini project Report
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Analysis of Response of First and Second-Order circuits.	8
2.	Analysis of Frequency Response of RLC circuit.	8
3.	Introduction to Filters.	8
4.	Introduction to Two-Port Circuits.	12
5.	Introduction to Mutual Inductance and Transformers.	12
6.	Introduction to Three-Phase Circuits, and Electronic Devices Circuits.	12
	Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Quizzes	Random	5 %
4.	Mini Project	Week 14	5 %
5.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
6.			

*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	James W. Nilsson and Susan A. Riedel, "Electric Circuits", 11th Edition, Pearson Prentice Hall. 2018
Supportive References	Boylestad, "Introductory Circuit Analysis", Twelfth Edition, Pearson Prentice Hall. 2010. Fundamentals of Electric Circuits by C. D. Alexander and M. N. O. Sadiku, third Edition, Mc Graw-Hill Education, 2007.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx www. en.wikipedia.org/wiki/Electrical_network www. allaboutcircuits.com
Other Learning Materials	James W. Nilsson and Susan A. Riedel, "Electric Circuits", 11th Edition, Pearson Prentice Hall. 2018

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Classroom with adequate daylight equipped with data projector, separated from white board.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Electrical Machines (1)	
Course Code: 220-ELE-3	
Program: Bachelor of Science in Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 03/03/2024	

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto – transformers, three-phase transformers), AC machinery fundamentals, three-phase induction machines (construction, operation, equivalent circuit, performance calculations, starting of induction motors), small AC motors (single-phase induction motors).					
5. Pre-requirements for this course (if any)**:**					
217-ELE-3 Electrical Circuits (2)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Analyze Single-phase transformers, auto – transformers and three-phase transformers. 2. Analyze three-phase induction machines. 3. Study the performance of the three-phase induction machines.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Define operation principles of electrical machines	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze fundamental characteristics of various types of machines	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.2	Evaluate equivalent circuit and characterize different electrical machines	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.3				
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Principles of operation; construction, equivalent circuit, elements of a transformer.	6
2.	The ideal transformer, practical transformers, open circuit test, short circuit test, efficiency , regulation	8
3.	Practical transformer, three-phase connections.	8
4.	Measurement in three-phase, auto-transformer, taps, instrument transformer, parallel operation.	6
5.	Basic theory and construction of squirrel-cage and wound-rotor motor	8
6.	Equivalent circuit, losses, power flow, efficiency.	8
7.	Analysis of machine equations; speed/torque curves, starting performance, starting methods	8
8.	Single-phase induction motors	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

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

E. Learning Resources and Facilities

1. References and Learning Resources

Es2.5sential References	Stephen J Chapman, Electrical Machinery Fundamentals, Publisher: McGraw-Hill Higher Education, 2011, 5th Edition.
Supportive References	- Denis O'Kelly, Performance and Control of Electrical Machines, Publisher: Mc-Graw Hill Book Company, 1991. - Karsai, D Kereny, L Kiss, Studies in Electrical and Electronic. Engineering 25, Large Power Transformers, Publisher: Elsevier, 1987

	- A E Fitzgerald, Charles Kingsley, Stephen D Umans, Electric Machinery, Sixth Edition, Publisher: Mc-Graw-Hill Higher Education, 2002. - Charles I Hubert, Electric Machines, Theory, Operation, Application, Adjustment and Control, Publisher: Macmillan Publishing Company, 1991. Dino Zorbas, Electric Machines, Principles, Applications, and Control Schematics, Publisher: West Publishing Company, 1989.
Electronic Materials	NA
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**

REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electronics (1)
Course Code:	231-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
This course introduces students to discrete semiconductor devices. It covers essential topics from basic semiconductor theory through to the application of diodes and transistors. It focuses the P-N junction and the Diode as a circuit element, the Bipolar Junction Transistor (BJT) as a circuit device, the Single stage BJT amplifier circuits, the Junction Field-Effect-Transistor (JFET) and the Metal Oxide Semiconductor Field Effect Transistor (MOSFET) as circuit element.					
5. Pre-requirements for this course (if any):					
216-ELE-3 Electrical Circuits (1)					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
After completing this course the students should be familiar to the following: 1. The discrete semiconductor devices. 2. The essential topics from basic semiconductor theory through to the application of diodes and transistors. 3. The P-N junction and the Diode as a circuit element. 4. The Bipolar Junction Transistor (BJT) as a circuit device, the Single stage BJT amplifier circuits. **5.** The Junction Field-Effect-Transistor (JFET) and the Metal Oxide Semiconductor Field Effect Transistor (MOSFET) as circuit element.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Recognize the basic operation and characteristics of a diode and its network applications.	1	Lectures Tutorials	Mid Term1 & 2, Final Exams and Quizzes
1.2	Determine the operation principle, characteristics, configurations and biasing of BJTs	1	Lectures Tutorials	Mid Term1 & 2, Final Exams and Quizzes
1.3	Identify and formulate the operation principle, characteristics, configurations and biasing of JFET and MOSFET.	1	Lectures Tutorials	Mid Term1 & 2, Final Exams and Quizzes
2.0	**Skills**			
2.1	Apply configurations of BJT transistor to design different circuits.	2	Lectures Tutorials	Mid Term1 & 2, Final Exams and Quizzes
2.2	Analyze and perform a small signal AC analysis using different techniques.	6	Lectures Tutorials	Mid Term1 & 2, Final Exams and Quizzes
2.3	Use the techniques, skills, and modern engineering tools such as Multisim simulator to	2	Lectures Tutorials	- Mini project Report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	design electronic circuits			
2.4				
2.5				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Semiconductor Materials, Energy Levels, Intrinsic and Extrinsic, Materials—n-and p-Type. PHYSICS OF Semiconductor Electronics.	8
2.	Diode Resistance Levels, Diode Equivalent Circuits Diode Specification Sheets, Zener Diodes, Light-Emitting Diodes (LEDs), Varactor and Photodiode. (Diode Circuits and Applications): Half and Full-Wave Rectification, Zener Diodes, Clippers, Clampers, Gates. Light-Emitting Diodes (LEDs), Varactor and Photodiode.	8
3.	Half and Full-Wave Rectification, Clippers, Clampers, Zener Diodes, Gates.	10
4.	Construction, Operation, Configuration, Limits of Operation, transistor Specification Sheet. Construction, Operation, Characteristics, and Configurations of BJT transistors.	10
5.	Operating Point for Fixed-Bias Circuit, Emitter Bias Circuit, Voltage-Divider Bias and Voltage Feedback. Biasing Circuits of BJT transistors.	6
6.	Fixed-Bias Configuration, Common Emitter Configuration and Voltage-Divider Configuration.	6
7.	Construction, operation, Characteristics of FETs, Bias and Amplifier Circuits Analysis. Construction, operation, Characteristics and Bias of FETs.	8
8.	Small Signal Amplifier analysis using different techniques.	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Term Exam1	6	20
2.	Mid Term Exam 2	12	20

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Mini Project	14	5
4.	Quizzes	Weekly	5
5.	Final exam	End of the semester	50
6.			

*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	Electronic Devices and Circuit Theory, Robert L. Boylestad, 11th Edition, 2013, Pearson Education.
Supportive References	Electronic Devices ,Tomas.L.Floyd, 9th Edition, 2011, Prentice Hall Electronic Principles, Albert Malvino and David Bates, 7th Edition, 2006, McGraw-Hill Education.
Electronic Materials	Notes of the concerned instructor on blackboard • http://lib.nu.edu.sa/digitallibbrary.aspx • www. en.wikipedia.org www. allaboutcircuits.com
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electromagnetism (1)
Course Code:	240-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
Electrostatics: Coulomb's law, Electric flux density, Gauss's law and applications, Electric potential, Electric dipole, Current density and conductors, Polarization in Dielectrics, Boundary conditions, Poisson's and Laplace's equations, Resistance, Dielectrics and Capacitance, Image method. Magnetostatics: Biot-Savart law, Ampere's circuit law and applications, Magnetic flux density, Maxwell's equations for static fields, Magnetic scalar and vector potentials					
5. Pre-requirements for this course (if any)**:**					
202-ELE-3, 105-PHYS-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Calculate electric field, force, potential, energy from various charges and charge distributions. 2. Calculate electric flux, flux density and total charge from Gaussian surfaces. 3. Calculate electric current density, electric current and resistance of conductors. 4. Calculate capacitance and polarization of dielectric materials. 5. Solve Laplace's equation and find capacitance and resistance of coaxial cables. 6. Use of different laws and equations to analyze electrostatic and magnetostatic fields. **7.** Study Maxwell's equations and analyze magnetostatic fields					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	10
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**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		45

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**			
1.1	Apply knowledge of the vector calculus and the fundamental laws of physics to understand the electric and magnetic fields.	7	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 1 - Test 2 -Final exam
1.2	Identify conductive, dielectric and magnetic properties of materials.	1	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 - Final exam
1.3				
2.0	**Skills**			
2.1	Analyze electrostatic forces, fields and potentials on different material environment.	6	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 1 -Final exam
2.2	Analyze magnetostatic fields and derive Maxwell's equations.	6	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 -Final exam
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Electrostatics: Coulomb's law, Gauss's law	8
2.	Electric potential and electric dipole	4
3.	Dielectrics and capacitance, current density and conductors	5
4.	Polarization in dielectrics, boundary conditions	6
5.	Poisson's and Laplace’s equations	6
6.	Magnetostatics: Biot-Savart, Ampere's circuit law and applications	6
7.	Magnetic flux density, Maxwell's equations for static fields	6
8.	Magnetic scalar and vector potentials	4
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Matthew N. O. Sadiku, “Elements of Electromagnetics”, Oxford Edition, 7th Edition, Saunders College, 2018.
Supportive References	William H. Hayt, Jr. John A. Buck , "Engineering Electromagnetics" Nineth Edition, 2019.
Electronic Materials	Electronically lecture notes provided in e-board.
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Signals and Systems Analysis	
Course Code: 242-ELE-3	
Program: Bachelor of Science in Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 03/03/2024	

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (6th/3rd)					
4. Course general Description:					
Motivation, Signal Classifications, Signal Operations, Eigen Functions; Theories of Fourier series for continuous and discrete time signals, Linear circuits and system concepts, impulse response, convolution and transfer function; Frequency response of systems, Fourier Transform, Laplace transform and z-transform with applications; Nyquist theorem for sampling of analog signals.					
5. Pre-requirements for this course (if any):					
202-ELE-3 Engineering Mathematics					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Use the different theories to analyze: i. Analog Signals ii. Digital Signals 2. Simulate the signal in both time and frequency domains.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Distinguish between continuous and discrete time signal and systems.	1	- Lectures - Tutorials	- Assignment - Quizzes - Midterm exam Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Manipulate different signal transformation techniques.	6	- Lectures - Tutorials	- Assignment - Quizzes - Midterm exam Final exam
2.2	Evaluate fundamental signal and system parameters, such as energy, power and bandwidth.	6	- Simulation - Lectures - Tutorials	- Quizzes - Assignment Final exam
2.3	Assess continuous linear time invariant system response, analytically and using different techniques.	6	- Simulation - Lectures - Tutorials	- Reports - Quizzes Final exam
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Motivation, Signal Classifications, Signal Operations, Eigen Functions.	8
2.	Theories of Fourier series for continuous and discrete time signals.	12
3.	Linear circuits and system concepts, impulse response, convolution and transfer function.	12
4.	Frequency response of systems, Fourier Transform with applications	8
5.	Laplace transform and z-transform with applications.	12
6.	Nyquist theorem for sampling of analog signals.	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Random	10
2.	Mid Exam 1	Week 6	20
3.	Mid Exam 2	Week 12	20
4.	Final Exam	At the end of the semester as determined by the academic calendar	50

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

E. Learning Resources and Facilities

1. References and Learning Resources

Es2.5sential References	Oppenheim, Willsky and Nawab,”Signals and Systems”, Pearson New International Edition 2015.
Supportive References	Signals, Systems, and Transforms, 4th Ed. C. L. Phillips, J. M. Parr, and E. A. Riskin, 2008.
Electronic Materials	Electronically lecture notes provided in e-board.

Other Learning Materials	MATLAB/Simulink

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Digital Logic Design
Course Code:	251-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 4

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 6

G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th/2nd)					
4. Course general Description:					
Number systems & codes. Logic gates. Boolean algebra. Karnaugh maps. Analysis and synthesis of combinational systems, decoders, multiplexers, adders and subtractors. Types of flip-flops. Sequential circuit analysis and design. VHDL and its application in basic gates.					
5. Pre-requirements for this course (if any):					
NA					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
The main purpose of this course is to identify how to analyze and design digital systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Define number systems; decimal, binary, octal and hexadecimal.	1	- Lectures - Tutorials	Mid-term 1 Final Quizzes
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze Boolean algebra and Karnaugh map for logic circuits simplification.	6	- Lectures - Tutorials	Mid-term 1 Final Quizzes
2.2	Analyze combinational logic and sequential logic circuits.	2	- Lectures - Tutorials	Mid-term 2 Final Quizzes
2.3	Design combinational logic and sequential logic circuits.	2	- Lectures - Tutorials	Mid-term 2 Final Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours

1.	Number systems	10
2.	Boolean algebra and logic gates	10
3.	Simplification of Boolean functions	8
4.	Combinational logic circuits design and analysis	4
5.	Digital combinational logic (decoders, encoders, multiplexers, demultiplexers)	4
6.	Digital combinational logic (adders and subtractors)	4
7.	Analysis of sequential circuits	6
8.	Design of sequential circuits.	8
9.	VHDL and its application in basic gates	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Quizzes	At the completion of every CLO	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Morris Mano , "Digital Design", Prentice Hall, Fifth edition, 2015.
Supportive References	John F. Wakerly, Digital Design: Principles and Practices Package, 4th edition, Prentice-Hall, 2007.
Electronic Materials	http://lib.nu.edu.sa/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show, Smart Board, Internet access
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Digital Logic Design Lab
Course Code:	252-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th/2nd)					
4. Course general Description:					
Number systems & codes. Logic gates. Boolean algebra. Karnaugh maps. Analysis and synthesis of combinational systems, decoders, multiplexers, adders and subtractors. Types of flip-flops. Sequential circuit analysis and design. Simulation of basic gates (OR, NOT) using VHDL.					
5. Pre-requirements for this course (if any)**:**					
NA					
6. Co-requisites for this course (if any)**:**					
Digital Logic Design (251-ELE-3)					
7. Course Main Objective(s):					
The main purpose of this course is to identify how to analyze and design digital systems.					

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**			
1.1	Define logic circuits laboratory and logic gates.	1	- Pre-lab lectures - Experiment	Exams, Quizzes, Pre-labs and reports
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze basic Boolean function using logic gates	6	- Pre-lab lectures - Experiment	Exams, Quizzes, Pre-labs and reports
2.2	Analyze combinational logic and sequential logic circuits.	6	- Pre-lab lectures - Experiment	Exams, Quizzes, Pre-labs and reports
2.3	Design combinational logic and sequential logic circuits.	2	- Pre-lab lectures - Experiment	Exams, Quizzes, Pre-labs and reports
2.4	Communicate effectively in group discussion and oral examination.	3	- Experiment -	Lab Performance and oral examination
3.0	Values, autonomy, and responsibility			
3.1	Work effectively as a member of the team.	5	- Experiment	Lab Performance and oral examination
3.2	Recognize ethical and professional	4	- Experiment	- Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	responsibilities in engineering situations and make informed judgments			
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction To ETS-8000A	2
2.	Experiment 1: Switch and LED	2
3.	Experiment 2.1: OR Gate; NOT Gate; NOT-OR Gate;	2
4.	Experiment 2.2:NOR Gate; 2-Input NAND Gate 4-Input NAND Gate ;AND-NOR Gate; Staircase Light Control;	2
5.	Experiment 3.1: verifying X+0 =X and X+1=1; verifying X*0 =0 and X*1=X; X+X=X, X+X'=1; X*X=X, X*X'=0; (X*Y)'=X'+Y'; (X+Y)'=X'*Y';	2
6.	Experiment 3.2: 2-Bit Magnitude Comparator; Voting Machine; Display Patterns;	2
7.	Experiment 4.1: Half Adder; Full Adder; Half Subtractor; Full Subtractor	2
8.	Experiment 4.2: 4-Bit Adder; 4-Bit Subtractor; BCD Adder	2
9.	Experiment 5: 8-to-3 Encoder ; 3-to-8 Decoder	2
10.	Experiment 6: Logic Unit; Implementing Logic Function with Multiplexer	2
11.	Experiment 7.1: NAND Gate RS Flip-Flop; NOR Gate RS Flip-Flop	2
12.	Experiment 7.2: JK Flip-Flop; T Flip-Flop; D Flip-Flop	2
13.	Experiment 8.1: Converting JK to D Flip-Flop; Converting JK to T Flip-Flop;	2
14.	Experiment 9: Simulation of basic gates (OR, NOT) using VHDL	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Reports	Every experiment	10%
2.	Pre-labs	Every experiment	10%
3.	Performance	Every experiment	10%
4.	Mid Term Exam	8	20%
5.	Final Exam	End of the semester	50%

*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	Morris , "Digital Design", Prentice Hall, Fifth edition, 2015.
Supportive References	John F. Wakerly, Digital Design: Principles and Practices Package, 4th edition, Prentice-Hall, 2007.
Electronic Materials	http://lib.nu.edu.sa/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab Room
Technology equipment (projector, smart board, software)	Data show, Smart Board, Internet access and lab materials
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Computer Applications in Electrical Engineering
Course Code:	253-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th/3rd)					
4. Course general Description:					
Introduction to MATLAB system, generate matrices and perform operations on them, plot data, annotate graphs, create scripts and functions, construct and manipulate data structures, set up basic data analysis. Interacting Simulink Software with MATLAB, Creating a Simulink Model, Modeling a Dynamic Control System. Introduction to LabVIEW virtual instruments (VIs), LabVIEW environments, creating, editing and debugging a VI, creating a sub VI, loops and charts, arrays, graphs, clusters, case and sequence structures, formula nodes.					
5. Pre-requirements for this course (if any)**:**					
Computer Programming for Engineers (204-GEC-3)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Use the MATLAB GUI and development environment effectively. 2. Design programs to solve engineering and mathematical problems. 3. Build block diagrams in Simulink to model engineering systems. **4.** Understand LabVIEW environment and use built in VI's. Course Main Objective					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Formulate the MATLAB GUI.	1	Lectures and Problem-solving.	In class quizzes, Test and Final exam.
1.2				
1.3				
2.0	**Skills**			
2.1	Carry out computations and visualize data in MATLAB.	6	• Offering extra tutorials for students • Encourage class participation	• Class participation Quizzes • Midterm exams. • Final Exams at the end of the semester.
2.2	Design programs to solve engineering and mathematical problems.	2	• Offering extra tutorials for students • Encourage class participation	• Class participation (Quizzes) • Midterm exams. • Home work • Final Exams at the end of

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				the semester.
2.3	Design graphical programming environment using LabVIEW	2	Class Lectures and Lab	• Mini-project • Final Exams at the end of the semester.
2.4	Design Simulink models to simulate engineering systems.	2	Class Lectures and Lab	• Mini-project • Final Exams at the end of the semester.
2.5	Communicate effectively to perform the presentation.	3		Class Lectures and Lab
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team-player in executing related project with imposed design constraints.	5		Class Lectures and Lab
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	Lectures	- Mini project Report
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to MATLAB system	4
2.	Generate matrices and perform operations on them	8
3.	Plot data, annotate graphs,	8
4.	Construct and manipulate data structures	12
5.	Set up a basic data analysis	8
6.	Creating a Simulink Model, Modeling a Dynamic Systems.	8
7.	Introduction to LabVIEW, virtual instruments, LabVIEW environments,	8
8.	Creating, editing and debugging a VI, creating a sub VI, loops and charts.	4

Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz 1	Week 4	5 %
2.	Quiz 2	Week 7	5 %
3.	Midterm	Week 10	30 %
4.	Homework, Mini-project and presentation	Week 13	10 %
5.	Final Exam (Practical)		20 %
6.	Final Exam (Theoretical)	At the end of the semester as determined by the academic calendar	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	Holly Moore, MATLAB for Engineers, 3/E, ISBN-10: 0132103257, ISBN-13: 9780132103251, Prentice Hall, 2012.
Supportive References	Ronald W. Larsen, LabVIEW for Engineers, ISBN-10: 0136094295, ISBN-13: 9780136094296, Prentice Hall, 2011.
Electronic Materials	None
Other Learning Materials	• MATLAB 2016a with Simulink Software. www.mathworks.com •LabVIEW 2011, Course manual, Course software version 2011, www.ni.com/LabVIEW

2. Required Facilities and equipment

Items	Resources
facilities	Computer Lab with a maximum capacity of 20 students

Items	Resources
(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	
Technology equipment (projector, smart board, software)	- 20 PC terminals - Laptops - Data show - MATLAB/Simulink - LabVIEW
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Machines (2)
Course Code:	320-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8^{th}/4^{th})					
4. Course general Description:					
Synchronous machines (construction, internal voltage, equivalent circuit, Phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of AC generators, synchronous motor, steady-state operation, starting), DC machines (construction, classification, performance, motor characteristics, starting of DC motors, speed control of DC motors).					
5. Pre-requirements for this course (if any)**:**					
220-ELE-3 Electrical Machines (1)					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. **To understand the basic principles of DC and synchronous machines.** 2. To know the operation and testing of DC and synchronous machines					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Classify the synchronous machines and dc machines.	1	- Lectures - Tutorials	- Test 1 , Test 2 - Quizzes Final exam
1.2	Explain the principle of operation of synchronous generators, motors and dc machines.	1	- Lectures - Tutorials	- Test 1 , Test 2 - Quizzes Final exam
1.3				
2.0	**Skills**			
2.1	Analyze the performance of synchronous machines and dc machines	6	- Lectures - Tutorials	- Test 1 , Test 2 - Quizzes Final exam
2.2	Design the equivalent circuits of synchronous machines and dc machines.	2	- Lectures - Tutorials	- Test 1 , Test 2 - Quizzes Final exam
2.3				
2.4				
2.5				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to synchronous machines and its construction ,Voltage Induced in the Armature Winding of Synchronous Machine, Equivalent Circuit of Synchronous Machine and its Phasor Diagram, Performance of Synchronous Generator	16
2.	Synchronous Generator Operating Alone, Parallel Operation of Synchronous Generators	16
3.	Synchronous Motor Analysis, Steady State Operation, Starting.	8
4.	Introduction to DC Machines and its construction, Classification of DC Machines, DC Generators Operation and Performance.	8
5.	DC Motors Characteristics, Starting of DC Motors.	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes, Report	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

*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	Stephen J Chapman, Electrical Machinery Fundamentals, Publisher: McGraw-Hill Higher Education, 2011, 5th Edition.

Supportive References	- Principles of Electric Machines and Power Electronics, P. C. Sen, John Wiley &Sons, second edition, 1997. - Denis O'Kelly, Performance and Control of Electrical Machines, Publisher: Mc-Graw Hill Book Company, 1991. - Karsai, D Kereny, L Kiss, Studies in Electrical and Electronic. Engineering 25, Large Power Transformers, Publisher: Elsevier, 1987 - A E Fitzgerald, Charles Kingsley, Stephen D Umans, Electric Machinery, Sixth Edition, Publisher: Mc-Graw-Hill Higher Education, 2002. - Charles I Hubert, Electric Machines, Theory, Operation, - Application, Adjustment and Control, Publisher: Macmillan Publishing Company, 1991. - Dino Zorbas, Electric Machines, Principles, Applications, and Control Schematics, Publisher: West Publishing Company, 1989.
Electronic Materials	None
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment	Students	- Questionnaire is administered upon completing the course syllabus. - Open discussion for the students during the semester to recognize their weak points in the course. Feedback from Test 1, Test 2 and Final exam records.
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback.

Assessment Areas/Issues	Assessor	Assessment Methods
		- Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams). Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits).
Quality of learning resources	Students	Questionnaire is administered by the end of every semester.
Verifying standards of student achievement	- Program leader Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Machines Lab
Course Code:	321ELE-1
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
Hands-on exercises to set up circuits along with measurement and observation capabilities to explore the operating principles and characteristics of transformers, DC and AC Motors and Generators.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
320-ELE-3 Electrical Machines (2)					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Gain an engineering appreciation of electrical machines' operation and their applications. 1. Develop practical skills for measuring electrical and mechanical quantities (Current, voltage, power, efficiency, regulation, torque, speed)					

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**			
1.1				
1.2				
1.3				
2.0	**Skills**			
2.1	Perform the experiment for operating characteristics of transformers.	6	- Pre-lab lectures - Experiment Computer programing tool (Multisim)	- Reports - Quizzes - Midterm exam Final exam
2.2	Obtain the operating characteristics of rotating machines.	6	- Pre-lab lectures - Experiment Computer programing tool (Multisim)	- Reports - Quizzes Final exam
2.3	Measure torque, power and parameters of electrical machines.	6	- Pre-lab lectures - Experiment Computer programing tool (Multisim)	- Reports - Quizzes Final exam
2.4	Communicate effectively in group discussion and oral examination.	3	- Experiment	Lab Performance and oral examination
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in	4	- Experiment	- Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	engineering situations and make informed judgments			
3.2	Work effectively as a member of the team.	5	- Experiment	Lab Performance and oral examination
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Experiments with the Single-phase Transformer, Voltage and Current Transformation, Voltage Behavior with Resistive Load, Evaluating Efficiency	4
2.	Experiments with the Single-phase Transformer, Equivalent circuit of transformer, Open circuit test, Short circuit test	4
3.	Three-phase transformer, voltage regulation, efficiency.	4
4.	DC machines starting and loading tests.	2
5.	Squirrel-cage induction motor, Locked-rotor test, No-load test, DC Test	4
6.	Squirrel-cage induction motor, Torque-speed characteristics.	4
7.	Synchronous generator, Measurement of no-load characteristics , Measurement of short-circuit characteristics, Measurement of load characteristics, Measurement of circuit parameters.	4
8.	Synchronous motor, Synchronous motor as mechanical driver, Synchronous motor as compensator	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Pre-Lab Quiz	Every Week/Experiment	10 %
2.	Report	Every Week/Experiment	10 %
3.	Lab Performance	Every Week/Experiment	10 %
4.	Midterm Exam	Week 8	20%
5.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
6.			

*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	Stephen J Chapman, Electrical Machinery Fundamentals, McGraw-Hill Higher Education, 2011, 5th Edition.
Supportive References	A E Fitzgerald, Charles Kingsley, Stephen D Umans, Electric Machinery, Sixth Edition, Mc-Graw-Hill Higher Education, 2002.Electronic Devices and Circuit Theory (7th ed.) by R. Boylestad and L. Nashelsky.
Electronic Materials	None
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	LAB room for a maximum 15 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment	Students	- Questionnaire is administered upon completing the course syllabus. - Open discussion for the students during the semester to recognize their weakness points in the course. - Feedback from Midterm and Final exam records.
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback - Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams).

Assessment Areas/Issues	Assessor	Assessment Methods
		Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits)
Quality of learning resources	Students	Questionnaire is administered by the end of every semester
Verifying standards of student achievement	- Program leader - Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power System Analysis (1)
Course Code:	324ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 4

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 6

G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8^{th}/4^{th})					
4. Course general Description:					
Power system components and representation; Transmission line and cable parameters; Analysis of transmission and distribution lines; Power factor correction, Electric insulators; Grounding systems					
5. Pre-requirements for this course (if any)**:**					
217-ELE-3 Electrical Circuits (2)					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. To understand basic concepts in the power system. 2. To conduct power transmission and distribution calculations.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	57	95
2	E-learning	03	5
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Recognize power system structure and operation.	7	- Lectures - Tutorials	- Homework - Quizzes Final exam
1.2	Recognize electrical insulators and power system grounding.	7	- Lectures - Tutorials	- Homework - Quizzes Final exam
2.0	**Skills**			
2.1	Analyze transmission lines performance.	6	- Lectures - Tutorials	- Homework - Test 1 Final exam
2.2	Design per-unit model of power systems.	2	- Lectures - Tutorials	- Homework - Quizzes - Test 2 Final exam
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to electrical energy systems	6
2.	Analysis of single-phase and three-phase circuits	4
3.	Calculation of transmission line parameters	6
4.	Transmission lines modeling and performance evaluation	16
5.	Electrical insulators	8

6.	Grounding systems	8
7.	Power factor correction	6
8.	Introduction to power system modeling and per-unit system	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	16 %
2.	Test 2	Week 12	16 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	18 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

*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	Power System Analysis, John J. Grainger and William D. Stevenson, Jr.-McGraw-Hill, 1994.
Supportive References	Husain, “Electrical power Systems”, CBS Publisher & Distributors, 1994.
Electronic Materials	None
Other Learning Materials	Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 20 students.
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment	Students	- Questionnaire is administered upon completing the course syllabus. - Open discussion for the students during the semester to recognize their weak points in the course. Feedback from Test 1, Test 2 and Final exam records.
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback. - Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams). Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits).
Verifying standards of student achievement	- Program leader Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Power Systems lab
Course Code:	325ELE-1
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
1 (0,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: ($8^{th}/4^{th}$)					
4. Course general Description:					
This lab course includes ten experiments to study various aspects of power systems: measurement of the characteristics data of a transmission line and an assessment of its voltage drop and losses; synchronization and steady state operation of a generator connected to an infinite bus system; load characteristics of a synchronous motor and effect of field excitation on reactive power load; effect of voltage levels on power transmission and effects of various load types on power plants; load flow data preparation and system study; analysis of symmetrical and unsymmetrical faults; power factor correction; performance and connections of power transformers.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
324-ELE-3 Power System Analysis (1)					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. To understand basic concepts in power system. 2. To conduct experimental work. 3. To measure electrical quantities and analyze data.					

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		

No	Mode of Instruction	Contact Hours	Percentage
	• 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**			
1.1				
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze the effect of active and reactive loading on the voltage drop and the power handling capability of a transmission line.	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams
2.2	Experiment paralleling of generators and connecting a generator to the grid	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams
2.3	Carry out a short circuit analysis study for symmetrical and	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	unsymmetrical faults and interpret the results of the analysis.			
2.4	Measure and calculate: complex power, real and reactive power; lagging and leading power factor, apparent power	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams
2.5	Manipulate the control of voltage, frequency, and power of an AC generator	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams
2.6	Practice the procedure used in preparing transmission line, load and generator data for a load flow system study.	6	- Pre-lab lectures - Experiment	Written report, quizzes and Exams
2.7	Communicate effectively in group discussion and oral examination.	3	- Experiment	Lab Performance and oral examination
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Transmission line model and voltage drop evaluation	2
2.	Load characteristics of a synchronous motor	2
3.	Load effect on power plants	2
4.	Phase sequence measurements	2
5.	Power factor correction	4
6.	Synchronizing an alternator and connecting it to the power system	2
7.	Real and reactive power control of an alternator	4
8.	Writing Matlab subroutines to solve the load-flow problem.	4
9.	Using commercial software to determine fault currents and voltages in 14-bus system	4
10.	Three-phase transformer connections.	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Pre-lab quiz	weekly	10%
2.	Lab report	weekly	10 %
3.	Lab performance	weekly	10 %
4.	midterm exam	Week 8	20 %
5.	Final Term exam	End of the semester	50 %
6.			

*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	Power System Analysis, John J.Grainger and William D. Stevenson, Jr.-McGraw-Hill, 1994.
Supportive References	Husain, "Electrical power Systems", CBS Publisher & Distributors, 1994.
Electronic Materials	None
Other Learning Materials	Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory equipped with adequate experimental facilities.
Technology equipment (projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback. - Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams). Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits).
Quality of learning resources	Students	Questionnaire is administered by the end of every semester
Verifying standards of student achievement	- Program leader Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electronics (2)
Course Code:	332-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7^{th}/4^{th})					
4. Course general Description:					
This course is a continuation of 231EE-3 course. It focuses the analysis of amplifier frequency response, the operational amplifiers design and applications, the power Amplifiers and the feedback concept and oscillator circuits.					
5. Pre-requirements for this course (if any)**:**					
231-ELE-3 Electronics (1)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be familiar with: 1. The power Amplifiers and the feedback concept. 2. The analysis of amplifier frequency response. 3. The operational amplifier design. 4. Feedback and oscillator circuits.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Compute frequency responses of FET and BJT amplifiers.	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze operational amplifiers and its sub-circuits.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.2	Analyze power amplifier circuits.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.3	Analyze oscillators using feedback techniques.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.4	Design operational amplifiers	2	-Lectures - Tutorials	- Mini project Report
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Power amplifier circuits: Class A, B, C, and D amplifiers.	20
2.	Frequency Response of Amplifiers: low and high frequency analysis of BJT and FET amplifier, multistage frequency effects.	10
3.	Operational amplifiers: differential amplifier circuit, Op-amp basics and applications.	15
4.	Feedback and Oscillator Circuits: Feedback concept, Practical feedback circuits, feedback amplifier, oscillators operation, phase-shift, Wien bridge, Tuned, Unijunction, crystal.	15
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Mini Project and Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Electronic Devices and Circuit Theory, Robert L. Boylestad, 11th Edition, 2013, Pearson Education
Supportive References	Electronic Devices ,Tomas.L.Floyd, 9th Edition, 2011, Prentice Hall

	Electronic Principles, Albert Malvino and David Bates, 7th Edition, 2006, McGraw-Hill Education
Electronic Materials	Notes of the concerned instructor on blackboard • http://lib.nu.edu.sa/digitallibbrary.aspx • www. en.wikipedia.org • www. allaboutcircuits.com
Other Learning Materials	**NA**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electronics Lab
Course Code:	333-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th/4th)					
4. Course general Description:					
This lab performs experimentation in basic electronic circuits and devices: Diodes, transistors (BJT, FET), DC and small signal AC Analysis, Amplifier configurations. It is equipped with basic electronics equipment package such as digital oscilloscopes, DMM, DC power supply units and function generators.					
5. Pre-requirements for this course (if any)**:**					
NA					
6. Co-requisites for this course (if any)**:**					
332-ELE-3 Electronics (2)					

7. Course Main Objective(s):

After completing this course the students should be able to:

1. Recognize of specification sheets of discrete semiconductor devices ,
2. Analyze of Electronic Circuits using semiconductor devices and lab techniques
3. Describe and analyze Zener Diodes, Light-Emitting Diodes (LEDs), Varactor and Photodiode.
4. Analyze of basic Half and Full-Wave Rectification, Clippers, Clampersand Zener Diodes,
5. Categorize Construction, Operation, Configuration, Limits of Operation of transistors,
6. Recognize Transistor Configurations, especially Configuration with Common Emitter
7. Analyze Transistors Biasing configurations: Operating Point for Fixed-Bias Circuit, Emitter Bias Circuit, Voltage-Divider Bias and Voltage Feedback,
8. Recognize and analyze of Small Signal AC Amplifier,
9. Making use of the equipments and techniques in the laboratory to translate the theory into reality

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
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**			
1.1	Apply the knowledge of electronics devices in Electrical Engineering applications.	7	- Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze characteristics of Semiconductor Diodes.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.2	Design Electronic circuits using BJT, FET Op. Amp.	2	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Communicate effectively in group discussion.	3	Lab demonstration	- Lab Report Oral Examination
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively as a member of the team.	5	Lab demonstration	Lab Report
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Experiment	- Reports
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	laboratory Test equipment's: voltage sources, Signal Generators, Oscilloscopes and discrete semiconductor devices	**2**
2.	Junction-Diode Characteristics	**2**
3.	Zener-Diode Characteristics	**2**
4.	Opto-Electronic Devices: LEDs, Photodiodes and Optocouplers	**4**
5.	Half-Wave and Full-Wave Rectification	**4**
6.	Transistor input and output characteristics	**2**
7.	Transistor as an amplifier	**4**
8.	Transistor as a switch	**4**
9.	Characteristics of a FET	**2**
10.	Basic Operational Amplifiers circuits	**4**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 8	20 %
2.	Quizzes	Every lab	10 %
3.	Lab Report	Every lab	20 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Electronic Devices and Circuit Theory, Robert L. Boylestad, 11th Edition, 2013, Pearson Education
Supportive References	Electronic Devices ,Tomas.L.Floyd, 9th Edition, 2011, Prentice Hall Electronic Principles, Albert Malvino and David Bates, 7th Edition, 2006, McGraw-Hill Education
Electronic Materials	Notes of the concerned instructor on blackboard • http://lib.nu.edu.sa/digitallibbrary.aspx • www. en.wikipedia.org • www. allaboutcircuits.com
Other Learning Materials	**NA**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab for maximum 10 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

Course Specification

(Bachelor)

Course Title: Electromagnetism (2)
Course Code: 340-ELE-3
Program: Bachelor of Science in Electrical Engineering
Department: Electrical Engineering
College: Engineering
Institution: Najran University
Version: 4
Last Revision Date: 03/03/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th/4th)					
4. Course general Description:					
This course covers forces due to magnetic fields, magnetic torque and moment, Magnetic dipole, magnetic boundary conditions, Inductors and inductances, magnetic energy and circuits. Time varying fields: Faraday's law, Transformer and motional emfs, Displacement current, Maxwell's equations and time harmonic fields, Wave equation, Power transfer and Poynting vector, Plane wave propagation in free space, in lossy dielectrics and in good conductors, Reflection of plane wave at normal and oblique incidences.					
5. Pre-requirements for this course (if any)**:**					
Electromagnetism (1) (240-ELE-3)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Analyze forces due to magnetic fields, magnetic torque and moment. 2. Study magnetic dipole, magnetic boundary conditions. 3. Calculate inductances and magnetic energy. 4. Apply Faraday's law to analyze the transformer and motional EMFs.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		45

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**			
1.1	Recognize magnetic torque, moment and boundary conditions.	1	- Lectures - Tutorials	- Test 1 - Assignment - Quizzes Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze forces due to magnetic fields, magnetic energy and circuits	6	- Lectures - Computer programing tools (MATLAB) - Tutorials	- Homework - Assignment - Quizzes - Test 1 Final exam
2.2	Analyze the motional EMFs, time-varying electric and magnetic fields.	6	- Lectures - Computer programing tools (MATLAB) Tutorials	- Homework - Assignment - Quizzes - Test 1 Final exam
2.3	Characterize the behavior of the wave propagation in reflection and refraction.	6	- Lectures - Tutorials	- Test 2 - Assignment - Quizzes Final exam
2.4	Evaluate wave propagation in different types of materials.	6	- Lectures - Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 2

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			Tutorials	Final exam
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Forces due to magnetic fields, magnetic torque and moment	6
2.	Magnetic dipole, magnetic boundary conditions	6
3.	Inductors and inductances, magnetic energy and circuits	6
4.	Faraday's law, transformer and motional emfs, displacement current, Maxwell's equations, time-harmonic fields.	6
5.	Wave equation, wave propagation in lossy dielectrics	6
6.	Plane wave propagation in lossless dielectrics, free space, and good conductor	6
7.	Power transfer and Poynting vector.	4
8.	Reflection of a plane wave at normal and oblique incidences.	5
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

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

E. Learning Resources and Facilities

1. References and Learning Resources

Es2.5sential References	Matthew N. O. Sadiku, "Elements of Electromagnetics", Oxford Edition, 7th Edition, Saunders College, 2018.
Supportive References	William H. Hayt, Jr. John A. Buck , "Engineering Electromagnetics" Nineth Edition, 2019.
Electronic Materials	Electronically lecture notes provided in e-board.
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**

REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Principles of Communication Systems
Course Code:	343-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7^{th}/4^{th})					
4. Course general Description:					
This course covers fundamental concepts of communication systems, which are essential for the understanding of advanced courses in digital/ wireless communications. Beginning with basic elements of Communication systems and Transmission through Systems and channels, the course will also cover several important modulation techniques such as Amplitude Modulation, Frequency Modulation, Phase Modulation etc., Superheterodyne receiver, Sampling process and Quantization, including Nyquist criterion and reconstruction of the original signal from the sampled signal, Pulse Modulation (PAM, PWM, PPM); TDM; Pulse Code Modulation (PCM); DPCM and DM. Further, the course will also cover concepts and advantages of Digital Communications, Line Coding (Binary Signaling), as well as Introduction to Digital Modulation (ASK, FSK, PSK).					
5. Pre-requirements for this course (if any)**:**					
Signals and Systems Analysis (242-ELE-3)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Categorize components of communication system. 2. Make use of signal analysis techniques in communication systems. 3. Analyze linear systems in time and frequency domains. 4. Categorize modulations techniques. 5. Analyze simple modulation systems. 6. Categorize multiplexing techniques. 7. Identify and analyze pulse code modulation systems. 8. Describe and analyze delta modulation systems. 9. Explain digital modulation techniques.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Explain digital modulation techniques.	1	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze linear systems in time and frequency domains.	6	- Lectures - Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 1 Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Analyze analog modulation techniques.	6	- Lectures Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 2 Final exam
2.3	Evaluate fundamental communication system parameters.	6	- Lectures Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 1 - Test 2 Final exam
2.4	Design Analog communication systems.	2	- Lectures - MATLAB Making field trips to Najran for example, TV & Radio transmission station in order to help students to understand various concepts of the course topics	- Group project - Oral - Presentation Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	Lectures	- Mini project Report

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to communication systems	4
2.	Review of Signals and signal space	4
3.	Analysis and Transmission of Signals	4
4.	Amplitude Modulation and Demodulations	16
5.	Angle Modulation & Demodulation	16
6.	Sampling and Analog-to-Digital Conversion	8
7.	Principles of Digital Data Transmission	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Communications Systems, Simon Haykin, John Wiley, 2010.
Supportive References	- Modern digital and analog communication systems, B. P. Lathi, Zhing, 2010. - Fundamentals of telecommunications, 2¬nd Edition, Roger L. Freeman, 2005. - Telecommunication and Data Communications Handbook, Ray Horak, 2008.
Electronic Materials	**None**
Other Learning Materials	Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Digital Communications
Course Code:	344ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
This course provides student with basics and advanced techniques for digital communication, which are the basic elements of modern communication systems. It presents the basic elements to implement any communication system and different digital technique such as source coding, channel coding, digital modulation and detection, noise and wireless channel. Examples of modern Communication Systems.					
5. Pre-requirements for this course (if any):					
Principles of Communication Systems (343-ELE-3)					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Categorize the basic elements of modern communication systems. 2. Classify of the advanced techniques for digital communication 3. Categorize digital modulations techniques. 4. Analyze digital modulation and demodulation systems. 5. Categorize wireless channel. 6. Analyze channel coding and error correction. 7. Explain modern communication systems					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify the main element of digital communication systems.	1	- Lectures Tutorials	- Homework - Assignment - Quizzes Final exam
1.2	Apply knowledge of mathematics, science, and engineering to the analysis of digital modulation techniques	7	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 1 Final exam
1.3				
2.0	**Skills**			
2.1	Analyze the process of digital communications transmission and reception and the effect of noise on signal quality.	6	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 2 Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Analyze the baseband signal coding, bandpass coding and channel coding in digital communications.	6	- Lectures - Tutorials Computer programing tools (MATLAB)	- Homework - Assignment - Quizzes - Test 2 Final exam
2.3	Design the basic digital communication systems.	2	- Lectures - Tutorials Computer programing tools (MATLAB)	- Mimi project - Quizzes - Test 2 Final exam
2.4	Communicate effectively to perform the presentation.	3	Class Lectures Tutorials	Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team-player in executing related project with imposed design constraints.	5	Class Lectures Tutorials	Mini-project
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	Lectures Tutorials	- Mini project Report
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Review of probability theory and random variables	4
2.	Introduction digital communication system	4
3.	Line and block code	4
4.	Pulse Code Modulation (PCM) and Delta Modulation (DM)	4
5.	Digital Modulation Techniques (ASK, FSK, PSK, GMSK and QAM)	12
6.	Error Detection and Correction	8
7.	Information Theory and Source Coding.	4
8.	Cryptography	4
9.	Transmission impairment & the wireless channels characteristics	4
10.	OFDM	4
11.	Modern communication system	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	5 %
4.	Mini Project and presentation	Week 13	5 %
5.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
6.			

*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	Digital Communications Fundamentals and Applications, by Bernard Sklar, Second Edition, Hall P T R, United States, 2017.
Supportive References	- John G. Proakis and MasoudSalehi, (2008), Digital Communications, Fifth Edition, McGraw-Hill, United States. - Behrouz A. Forouzan, (2007), Data Communications & Networking, Fourth Edition, McGraw-Hill, United States. - Todd K. Moon, (2005), Error Correction Coding Mathematical Methods and Algorithms, A John Wiley & Sons, Inc, Canada. - Andrew J.Viterbi & Jim K Omura, (1979), Principles of digital communication and coding, McGraw-Hill, United States. - Upamanyu Madhow, (2008), Fundamentals of Digital Communication, Cambridge University, UK.
Electronic Materials	None
Other Learning Materials	Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
The effectiveness of teaching and assessment	Students	- A questionnaire is administered upon completing the course syllabus. - Open discussion for the students during the semester to recognize their weak points in the course. - Feedback from Test 1, Test 2 and Final exam records.
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.
The extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback. - Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams). - Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits).
Quality of learning resources	Students	A questionnaire is administered by the end of every semester.
Verifying standards of student achievement	- Program leader Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Communications Lab
Course Code:	345ELE-1
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
1 (0,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
Experiments on signal representation and filtering, amplitude modulation and demodulation, delta modulation (DM) and demodulation, frequency modulation and detection, sampling and quantization, pulse amplitude modulation (PAM), pulse code modulation (PCM) and demodulation, Time Division Multiplexing (TDM). Digital modulation and demodulation for ASK, FSK, 2PSK, 4PSK, Shift Keying Noise Susceptibility error detection, error correction, and modem operating modes.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
344-ELE-3 Digital Communication					
7. Course Main Objective(s):					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
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**			
1.1				
1.2				
1.3				
2.0	**Skills**			
2.1	Apply Fourier transform to different type of signals in communication systems.	6	Lab Sessions using CASSY lab2	- Mid-term exams. - Final Exam. Lab reports
2.2	Analyze and evaluate different analogue modulation and demodulation techniques like AM, FM and DM, in time and frequency domains using lab modules.	6	Lab Sessions using CASSY lab2.	- Mid-term exams. - Final Exam. Lab reports
2.3	Apply sampling to achieve Pulse Amplitude Modulation (PAM) and Pulse Code Modulation (PCM) using lab modules.	6	Lab Sessions using CASSY lab2	- Mid-term exams. - Final Exam. Lab reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Recognize the Time Division Multiplexing (TDM) using lab modules.	6	Lab Sessions using CASSY lab2	- Mid-term exams. - Final Exam. Lab reports
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Experiment	- Reports
3.2	Work effectively as a member of the team.	5	- Experiment	Lab Performance and oral examination
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Getting started with Communications Lab modules and devices.	2
2.	Experiment #1: DSB-LC modulation and demodulation experiment on CASSY2 LAB	2
3.	Experiment #2: DSB-SC modulation and demodulation experiment on CASSY2 LAB	2
4.	Experiment #3: SSB modulation and demodulation experiment on CASSY2 LAB	2
5.	Experiment #4: Pulse Amplitude Modulation (PAM) experiments on CASSY2 LAB	2
6.	Experiment #5: FM modulation and demodulation experiment on CASSY2 LAB	2
7.	MID Exam	2
8.	Experiment #6: ASK and FSK modulation and demodulation on COM3LAB-Board 700 74	2
9.	Experiment #7: 2PSK and 4PSK ASK modulation and demodulation	2
10.	Experiment #8: Differential Phase Coding (DPSK) modulation and demodulation on COM3LAB-Board 700 74	2
11.	Experiment #9: Shift Keying Noise Susceptibility on COM3LAB-Board 700 74	2
12.	Experiment #10: Error detection and error correction on COM3LAB-Board 700 74	2
13.	Experiment #11: Influence of the Transmission Channel on COM3LAB-Board 700 74	2
14.	Experiment #12: Modem Operating Modes on COM3LAB-Board 700 74	2
15.	Final Exam	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid-Term exam	Week 8	20 %
2.	Lab Performance and Pre-quizzes	Every Week	10 %
3.	Experiment Reports	Week 14	20 %
4.	Final Exam	End of semester	50 %
5.			
6.			

*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	Communications Systems, Simon Haykin, John Wiley, 2010.
Supportive References	- Modern digital and analog communication systems, B. P. Lathi, Zhing, 2011. - Fundamentals of telecommunications, 2nd Edition, Roger L. Freeman, 2005. Telecommunication and Data Communications Handbook, Ray Horak, 2008.
Electronic Materials	- AM Manual - FM Manual - PCM Manual The COM3LAB-Board 700 74 Manual
Other Learning Materials	- CASSY Lab 2 System Computer programing tools (MATLAB)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratory hall suitable for 15 students
Technology equipment (projector, smart board, software)	- PC - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment	Students	- Questionnaire is administered upon completing the course syllabus. - Open discussion for the students during the semester to recognize their weak points in the course. Feedback from midterm and Final exam records.
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form.
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program.
Improvement of teaching	- Students Peer reviewer	- Learning from students feedback. - Learning from peer reviewer and department feedback. - Learning/Using various teaching methods (lectures, discussions, workshops, exams). Learning/Using various teaching mediums (projector, whiteboard, videos, educational visits).
Quality of learning resources	Students	Questionnaire is administered by the end of every semester
Verifying standards of student achievement	- Program leader Independent member teaching staff	Check student's marks by an independent teaching staff member /program leader a sample of student work and remark tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Introduction to microprocessor
Course Code:	354-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th/4th)					
4. Course general Description:					
Microprocessors architecture; Addressing modes and techniques; Instruction set; Assembly language programming; Interrupt systems; Input/output devices and timing; Memory devices; Future trends in microprocessors.					
5. Pre-requirements for this course (if any)**:**					
251-ELE-3 Digital Logic Design					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Describe the major components of a computer system and state their function and purpose. 2. Recognize the hardware and software model of microprocessors. 3. Identify addressing modes, instruction set of microprocessors. 4. Demonstrate the ability to program a microprocessor in assembly language. 5. Identify interrupt, memory and input/output interfaces					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Identify the computer system and the 8086 architecture model	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2	Identify memory, i/o devices and interfaces, and the interrupt.	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.3				
2.0	**Skills**			
2.1	Classify addressing modes and the instruction set.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.2	Demonstrate the ability to program using the assembly language.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.3				
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to microprocessors and microcomputers	8
2.	Software architectures of the 8088 and 8086 microprocessors.	8
3.	Assembly language programing	16
4.	The 8086 microprocessor programing instructions and program structures.	16
5.	The 8086 microprocessor and their memory and input/output interfaces.	8
6.	Modern microcontrollers like Arduino.	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Walter A. Triebel and Avtar "Singh The 8088 and 8086 Microprocessors: Pearson New International Edition: Programming, Interfacing, Software, Hardware, and Applications",2013
Supportive References	The 80X86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing Volumes I & II", Prentice Hall.
Electronic Materials	• http://lib.nu.edu.sa/ • http://lms.nu.edu.sa/www. allaboutcircuits.com
Other Learning Materials	**NA**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Microprocessor Lab
Course Code:	355-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th/4th)					
4. Course general Description:					
Microprocessors architecture; Addressing modes and techniques; Instruction set; Assembly language programming; Interrupt systems; Input/output devices and timing; Memory devices; Future trends in microprocessors; Modern microcontrollers like Arduino.					
5. Pre-requirements for this course (if any):					
NA					
6. Co-requisites for this course (if any):					
Introduction to Microprocessor, 354-ELE-3					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Identify the 8086 training kit and demonstrate the basic operations and assembly commands. 2. Develop microprocessors arithmetic and logic instructions. 3. Implement hardware interfaces to practical systems. 4. Recognize the microprocessor interrupts.					

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**			
1.1	Identify the 8086 training kit and demonstrate the basic operations and assembly commands.	1	- Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Design a program for microprocessors arithmetic and logic instructions.	2	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.2	Implement hardware interfaces to practical systems.	6	Lab demonstration	- Quizzes - Lab Report - Test 1 Final exam
2.3	Communicate effectively in group discussion.	3	Lab demonstration	- Lab Report Oral Examination
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively as a member of the team.	5	Lab demonstration	Lab Report
3.2	Recognize ethical and professional	4	- Experiment	- Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	responsibilities in engineering situations and make informed judgments			
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to 8086 microprocessors	6
2.	Experiment #1: Introduction to MDA – 8086 Training Kit	2
3.	Experiment #2: Basic operations of MDA 80x86 trainer kit	2
4.	Experiment #3: different commands of MDA 80x86 trainer Kit	4
5.	Experiment #4: Explore kit mode functionality	4
6.	Experiment #5: Explore PC mode functionality	2
7.	Experiment #6: Write a program to display the digits in decimal, from 0-7 into 7-segment	2
8.	Experiment #7: initialize DOT MATRIX DISPLAY	2
9.	Experiment #8:A/D convertor application	2
10.	Experiment #9:D/A convertor application	2
11.	Experiment #10: Modern microcontrollers like Arduino	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 8	20 %
2.	Quizzes	Every lab	10 %
3.	Lab Report	Every lab	20 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Walter A. Triebel and Avtar "Singh The 8088 and 8086 Microprocessors: Pearson New International Edition: Programming, Interfacing, Software, Hardware, and Applications",2013
Supportive References	The 80X86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing Volumes I & II", Prentice Hall.
Electronic Materials	Lab notes are delivered to the students through online portal "Blackboard"
Other Learning Materials	**NA**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab for maximum 10 students
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**

REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Automatic Control
Course Code:	361-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8^{th}/4^{th})					
4. Course general Description:					
Review of mathematical background (complex variables, Laplace, Diff. Equations); System representation (block diagram, transfer functions, signal flow graph) Modeling of electric and mechanical systems; State variable analysis; Stability; Time domain analysis; Root locus; Frequency domain analysis; Introduction to PID control.					
5. Pre-requirements for this course (if any)**:**					
242-ELE-3 Signal and Systems Analysis					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Represent a system using (block diagram, transfer functions, signal flow graph) 2. Analyze a system both Time domain and Frequency domain 3. Construct the state-space model 4. Evaluate the control system stability.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Represent a system using block diagram, transfer functions, signal flow graph.	1	- Class Lectures, MATLAB programming Tutorials	Quizzes, Mid Term Exams, Final Exam
1.2	Identify the control system stability	1	- Class Lectures Tutorials	Quizzes, Mid Term Exams, Final Exam
1.3				
2.0	**Skills**			
2.1	Design a control system both in time domain and frequency domain	2	- Class Lectures Tutorials	Quizzes, Mid Term Exams, Mini-Project Final Exam
2.2	Construct the state-space model	6	Class Lectures Tutorials	Quizzes, Assignment, Mid Term Exam, Final Exam
2.3	Communicate effectively to perform the presentation.	3	Class Lectures Tutorials	Presentation
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team-player in executing related	5	Class Lectures Tutorials	Mini-project

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	project with imposed design constraints.			
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	Lectures Tutorials	- Mini project Report
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Control Systems	4
2.	Differential Equations of Physical Systems	4
3.	Transfer Function of Linear Systems-Block Diagram Models-Signal Flow Graphs [SFG]	12
4.	State Variable Models- SFG State Models-TF from State Equations-State Transition Matrix	12
5.	Performance of Feedback Control Systems	8
6.	Stability of Linear Feedback Systems	8
7.	Root Locus Technique.	8
8.	Frequency Response Method & Stability in the Frequency Domain.	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Random	5 %
2.	Assignment	Week 9	1 %
3.	Mini Project and presentation	Week 13	4 %
4.	Mid Term 1 Exam	Week 6	20 %
5.	Mid Term 2 Exam	Week 12	20 %
6.	Final Exam	End of Semester	50 %

*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	Modern Control Systems, by Richard C. Dorf and Robert H. Bishop, Pearson Education, 15. October 2013.
Supportive References	1 Modern Control System Theory and Design 2nd edition, Stanley Shinner, Interscience, 1998. 2 Automatic Control Systems, Benjamin Kuo, Prentice-Hall, 2002. 3 Control System Engineering, by Normon S Nise, 2008.
Electronic Materials	Youtube channel for control concepts
Other Learning Materials	Lecture notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	White Board, Smart Board
Other equipment (depending on the nature of the specialty)	Students use their own Laptops with software Matlab to complete mini project

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**

DATE	21/3/2024

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Automatic Control Lab
Course Code:	362-ELE-1
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (1)					
1 (0,1,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
Experiments to support control theory using physical processes (e.g. water level, temperature control, light intensity control, etc); Control system simulation using Matlab; Modeling of physical (experimental) equipment; Static performance; Transient analysis; Measuring devices; Two-position control; Proportional control; PID control.					
5. Pre-requirements for this course (if any)**:**					
NA					
6. Co-requisites for this course (if any)**:**					
Automatic control (361-ELE-3)					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. It is concerned with modern control techniques. 2. Student learns how to run Experiments include system identification, dynamic analysis of control systems with application to level, temperature, flow and pressure controls, PID tuning, and typical process control systems.					

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**			
1.1				
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze the control system using MATLAB simulation tools.	6	- Experiment procedure explanation Computer programing tools (MATLAB) and Cassy Lab verification	- Lab report - Mid-term exam Final exam
2.2	Analyze the control system using Cassy-Lab real-time simulation tools.	6	- Experiment procedure explanation Computer programing tools (MATLAB) and Cassy Lab verification	- Lab report - Mid-term exam Final exam
2.3	Analyze PID and two-position controller.	6	- Experiment procedure explanation Computer programing tools (MATLAB) and Cassy Lab verification	- Lab report - Mid-term exam Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Verify modern control concepts	6	- Team work on Getting the experiment results - Oral presentation of selected experiments Final exam	- Lab report - Mid-term exam -Final exam
2.5	Communicate effectively in group discussion and oral examination.	3	- Experiment	Lab Performance and oral examination
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Experiment	- Reports
3.2	Work effectively as a member of the team.	5	- Experiment	Lab Performance and oral examination
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the Computer-Aided Design Package MATLAB	2
2.	Simulation of a Prototype Second Order System	2
3.	Real-Time Simulation of the Second Order System using Cassy-Lab	2
4.	Unit Step Response of Proportionate, Integrator and Differentiate Controller	4
5.	PID Controller	4
6.	Air Flow Control	4
7.	Light Intensity Control	4
8.	Temperature Control	4
9.	Water level and flow rate control	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Reports	Every experiment	20%
2.	Pre-lab Quiz	Every experiment	10%
3.	Mid Term Exam	Week 8	20%
4.	Final Exam	End of the semester	50%

*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	Dorf and R. Bishop "Modern Control Systems", Addison-Wesley, 1998.
Supportive References	Lab Manuals.
Electronic Materials	None
Other Learning Materials	MATLAB tutorials

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lab for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Graduation Project (1)
Course Code:	391ELE-2
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2 (1,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (8^{th}/4^{th})					
4. Course general Description:					
The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. These projects may be "new," continuation of work done in previous courses; or may be projects started in a previous course that become significantly expanded and enhanced for the thesis. It has two phases- to be taken in consecutive two semesters at senior level. At the beginning of the semester, the students propose a topic on which they are supposed to work as a group. Project students meet in class weekly, discuss their research, and screen their progresses for peer and faculty critique and suggestions. At the end of the semester, students present their thesis projects to the supervising committee.					
5. Pre-requirements for this course (if any)**:**					
253-ELE-3; 308-GEC-3, should complete 120 hours					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Ability to formulate design project and manage it. 2. Ability to review related data and knowledge from credible sources. 3. Ability to communicate orally and to report technically.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	20	44%

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	25	46%
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

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**			
1.1	Review the available literature in the project domain.	7	Discussion rounds, homework, assignments	- Discussion, presentation
1.2	Identify and formulate engineering problems in the area of electrical engineering	1	discussion rounds, homework, assignments	- Discussion, presentation
2.0	**Skills**			
2.1	Design a system, component or process with defined constraints.	2	- Lectures - Discussion rounds Tutorials	- Presentation Final Report Draft
2.2	Solve engineering problems and implement designed solution	2	- Lectures - Discussion rounds Tutorials	- Log book - Presentation Final Report Draft

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Communicate effectively in written engineering report and in oral presentation	3	discussion rounds, homework, tutorials, assignments	Discussion, presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively as a member of the team	5	discussion rounds, homework, assignments	Discussion, presentation
3.2	Plan a project effectively using project-planning techniques to ensure proper timing, budgeting and professional ethics.	4	discussion rounds, homework, assignments	Discussion, presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Choose a project and write a proposal.	5
2.	Initial Student Presentations: project title, description, motivation and aims.	6
3.	Project planning, process, management activities, work breakdown, time estimation, milestones, activity sequencing, activity network, scheduling, Gantt charts and re-planning.	8
4.	Literature survey: search and review, tracing the information, critical evaluation, writing literature review, ethics and responsibilities.	6
5.	Software development, life cycle, models, assistance in writing the progress report	6
6.	Student presentations: project proposal: problem definition, objectives, justification, and approach.	6
7.	Final presentation & final report (committee)	8
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Logbook (supervisor)	Every week	10 %
2.	Final Report Draft (supervisor)	Week 13	30 %
3.	Mid Term Presentation	Week 14	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Presentation (examination panel)	Week 14	15 %
5.	Final Report Draft (examination panel)	Week 14	25 %
6.			

*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	Any available books in the library related to project work.
Supportive References	The students review the literature of the project from Published research articles.
Electronic Materials	Youtube channel for project concepts
Other Learning Materials	The work is done by the students on the software related to the project (like MATLAB, Pspice, Lab view, ARDUINO)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	The department provides the classroom and Lab facilities needed by the students.
Technology equipment (projector, smart board, software)	MATLAB, Pspice, Lab view, ARDUINO
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Lecture contents, organization	Peer Reviewer	The peer reviewer monitors a teaching session and evaluate the course instructor using peer evaluation form.
Lecturer interaction with students, use of learning resources, verbal communication	Peer Reviewer	The peer reviewer monitors a teaching session and evaluate the course instructor using peer evaluation form.
Verification of students achievements	Independent faculty member	Review and verify the marking and grades of the students.

Assessment Areas/Issues	Assessor	Assessment Methods
Improvement in teaching	Student surveys, Peer Evaluation	Teaching strategies could be improved based on the students feedback and peer evaluation.
Effectiveness of teaching and assessment	Students survey	Students evaluate the course instructor through survey and through edugate.
Extent of achievement of course learning outcomes	Quality coordinator	CLOSO program.
Quality of learning resources	Students survey	Questionnaire is administered in every semester

ents, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Renewable Energy System
Course Code:	418-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
Introduction, Energy and Civilization, Distributed Generation Technologies & Economics, Fundamentals of Solar Power Systems, Concentrated Solar Power, Fundamentals of Wind Power Systems, Energy Storage, Integration of Distributed Generation into the Grid, Impact of Distributed Generation on Power System Operation, Applications.					
5. Pre-requirements for this course (if any)**:**					
Power Systems Analysis (1): 324-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Recognize how renewable energy resources can help the economy and environment. 2. Categorize types of renewable energy resources. 3. Describe the principles of the most common renewable energy systems. 4. Recognize and analyze Solar Power Systems. 5. Recognize and analyze Wind Power Systems. 6. Design of renewable energy systems. 7. Making use of the equipment and techniques in the Renewable Energy Laboratory to translate the theory into reality.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	40
2.	Laboratory/Studio	20
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		60

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**			
1.1	Recognize the need of renewable energy technologies and their role.	1	Lectures	- Assignment - Quizzes - Final exam
1.2	Classify the different types of Renewable Energy Sources	1	Lectures	- Assignment - Quizzes - Test 1 - Final exam
1.3				
2.0	**Skills**			
2.1	Design Renewable Energy Systems.	2	Lectures	- Quizzes - Test 2 - Final exam
2.2	Analyze and perform experiment related to Renewable Energy Systems meeting residential and industrial needs.	6	- Lectures - Lab	- Lab reports - Quizzes - Test 2 - Final exam
2.3	Communicate effectively to perform the presentation.	3	- Lectures - Lab	- Mini project - Oral exam
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team-player in	5	- Lectures - Lab	- Mini project - Oral exam in Lab

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	executing related projects with imposed design constraints.			
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Energy and Civilization	5
2.	Distribution Generation Technologies & Economics	5
3.	Fundamentals of Solar Power Systems	3
4.	Concentrated Solar Power	3
5.	Fundamentals of Wind Power Systems	3
6.	Energy Storage	3
7.	Integration of Distribution Generation into the Grid	5
8.	Impact of Distribution Generation on Power System Operation	8
9.	Applications	5
Total		**40**

No	List of Experiment LAB	Contact Hours
1	Experiment 1: Determining the no-load characteristics of the generator: To understand the relationship between the generator’s output voltage and rotation speed.	2
2	Experiment 2: Operation of a real, small wind power plant	2
3	Experiment 3: Operation of the Inverters under various loads: To examine operation in the storage mode at various loads and wind speeds.	2
4	Experiment 4: Operation with different loads: To examine operation in the storage mode at various loads and wind speeds.	2
5	Experiment 5: Converting light into electricity: In this experiment, we will demonstrate how a solar cell converts sunlight or electric light into a different form of energy.	2
6	Experiment 6: Solar radiation's angle of incidence: In this experiment, we will examine a solar cell's response to the radiated light's angle of incidence.	2
7	Experiment 7: Shading: In this experiment, we will examine the effect of shading on a solar module connected in series to three further modules.	2

8	Experiment 8: Loads in direct operating mode: In this experiment, we will examine the response of a PV module connected to a variety of loads (consumers) in the direct operating mode.	2
9	Experiment 9: Facility planning: The size of the stand-alone photovoltaic system is determined decisively by the total power / consumption of the involved electrical loads. Energy requirements are determined most easily by preparing a list of all electrical loads and their rated powers (in watts). You also need to determine each load's daily operating hours, through estimation and/or consultation with the customer. The power levels and daily operating hours can then be used to calculate the daily energy requirements.	2
10	Experiment 10: Lowering energy requirements: the power required of the solar modules is too high to permit installation on the roof. The task now is to lower power requirements by advising the customer on ways of saving energy.	2
Total		**20**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	15 %
2.	Test 2	Week 12	15 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Lab Report	Every week	10 %
5.	Final Exam (Practical)	At the end of the semester as determined by the academic calendar	20 %
6.	Final Exam (Theoretical)	At the end of the semester as determined by the academic calendar	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	Design of Smart Power Grid Renewable Energy Systems, Ali Keyhani, John Wiley 2011, ISBN 978-0470-62761-7
Supportive References	- The Integration of Distributed Generation in the Power System, Math Bollen. Fainan Hassan, John Wiley 2011, ISBN 978-0470-64337-2

	- Renewable Energy Technologies, edited by J.C. Sabonnadiere, Wiley, 2009, ISBN 978-1-84821-135-3 - Sustainable Energy Systems and Applications, Springer, 2011, 978-0-387-95860-6
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**

DATE	**21/3/2024**

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Energy Efficiency
Course Code:	419-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course will provide the student with a practical understanding of the energy efficiency measures which can be implemented by large and medium industrial and commercial energy users, and domestic users. It will cover energy technologies including energy auditing, rate structures, economic evaluation techniques, lighting efficiency improvement, HVAC optimization, combustion and use of industrial waste, steam generation, distribution system performance, process energy management, and maintenance considerations.					
5. Pre-requirements for this course (if any)**:**					
Power Systems Analysis (1): 324-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Identify and describe the energy conservation opportunities in industrial and commercial systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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			
1.1	Identify and describe the energy conservation opportunities in industrial and commercial systems.	1	- Lectures - Tutorials	- Test 1 - Test 2 - Homework - Assignment - Quizzes - Final exam
1.2	Describe the energy rate structures.	1	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
1.3	Use advanced technology to monitor and control energy use.	7	- Lectures - Tutorials	-
2.0	Skills			
2.1	Present energy efficiency and demand management projects and proposals.	6	- Lectures - Tutorials	- Quizzes - Test 1 - Final exam
2.2	Apply energy auditing techniques.	6	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
2.3				
3.0	Values, autonomy, and responsibility			
3.1	Examine the economic evaluation	4	- Lectures - Tutorials	- Homework - Assignment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	of energy conservation solutions.			- Quizzes - Final exam
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to energy efficiency and conservation measures, low cost/ no cost energy conservation measures.	4
2.	Energy management program.	8
3.	The energy audit process.	8
4.	Understanding energy bills.	8
5.	Lighting, heating, ventilation, and air conditioning.	8
6.	Energy efficiency in pumps, fans, motors, belt drives, variable speed/frequency drives.	8
7.	Combustion process and industrial waste.	8
8.	Control systems & computers to monitor energy use.	8
9.		
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Kennedy, William J., Turner, Wayne C., and Capehart, Barney L. Guide to Energy Management, The Fairmount Press, 8th edition, 2016.
Supportive References	- Stephen W. Fardo, Dale R. Patrick, Ray E. Richardson, and Brian W. Fardo. Energy Conservation Guidebook, 3rd Edition. - Steve Doty and Wayne C. Turner. Energy Management Handbook, 8th Edition.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Electrical Drives	
Course Code: 430-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
Principles of electric drive; Definitions; Electrical considerations: running, starting, braking; Mechanical considerations: type of enclosure, noise, drive transmission, motor selection; Electric traction; DC & AC solid state drives.					
5. Pre-requirements for this course (if any):					
Electrical Machines (1): 220-ELE-3					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Recognize the structure and operation of different types of electric drive systems. 2. Study the characteristics and use of electric drives.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	57	95
2	E-learning	03	5
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	

4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Define and classify the different electrical machines and drive systems.	1	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze solid state power electronic circuits for DC and AC drive systems.	6	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 - Final exam
2.2	Design models of DC, AC motors and speed controller.	2	- Lectures - Tutorials	- Mini project - presentation - Assignment - Quizzes - Test 2 - Final exam
2.3	Analyze the AC motor speed controller.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 - Final exam
2.4	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Mini Project - Presentation
3.0				
3.1	Recognize ethical and professional responsibilities in engineering	4	- Lectures - Tutorials	- Mini project - Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	situations and make informed judgments			
3.2	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to electrical drives and solid-state power converters.	6
2.	Basic components of electrical drive systems.	4
3.	Analysis of the basic criterion of selecting an electric motor for a given drive system.	6
4.	DC solid state drive systems.	18
5.	AC solid state drive systems.	18
6.	Application of control methods to regulate motor speed, position, and torque.	8
7.		
8.		
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	15 %
2.	Test 2	Week 12	15 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	20 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Krishnan, "Electric Motor Drives", Prentice Hall, 2001. Electrical Machines and Drives, Melkebeek, Jan, Springer, 2018
Supportive References	Theodore Wildi, "Electrical Machines, Drives, and Power Systems", 6Th Edition, 2006.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Power System Protection
Course Code:	431-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 6

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
The course provides comprehensive concepts of power system protection including an understanding of the principles of the operation of protection system components, e.g. fuses, relays, circuit breakers, instrument transformers and their applications for the design of protection systems for transmission lines, busbars, motors, generators, and transformers.					
5. Pre-requirements for this course (if any)**:**					
Power Systems Analysis (1): 324-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. To understand basic concepts in power system protection. 2. To conduct relay selection and setting calculations.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	

3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Explain the principles of operation of protective devices	1	- Lectures - Tutorials	- Test 1 - Homework - Assignment - Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Apply the fundamental principles of power system protective devices	6	- Lectures - Tutorials	- Quizzes - Test 1 - Final exam
2.2	Analyze the performance of power system transducers	6	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
2.3	Design of protection systems for transmission lines, busbars, transformers, generators, and motors	2	- Lectures - Tutorials	- Test 2 - Mini Project - Quizzes - Final exam
2.4	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Mini Project - Presentation
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Reports
3.2	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Symmetrical and Unsymmetrical fault calculations	6
2.	Introduction to protective relaying and switchgear	6
3.	Relay types and operating principles	6
4.	Current and voltage transformers	6
5.	Over-current protection of lines	6
6.	Distance protection of lines	8
7.	Pilot line protection	6
8.	Rotating machine protection	6
9.	Transformer protection	6
10.	Busbar protection	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Power system relaying. Horowitz & Phadke. (2nd Ed.) J. Wiley, 1995.
Supportive References	Power system protection, P. Andersen, Wiley, 1999.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Power System Analysis (2)	
Course Code: 432-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 6

G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course provides students with a working knowledge of power system problems and computer techniques used to solve some of these problems. Topics covered include power system components and modeling, optimal dispatch of generation, symmetrical three-phase faults, symmetrical components, unsymmetrical faults, power flow, and power system stability.					
5. Pre-requirements for this course (if any)**:**					
Power Systems Analysis (1): 324-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. To understand basic concepts in power system operation. 2. To conduct power flow and short circuit studies.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	

3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Recognize power system components and models.	1	- Lectures - Tutorials	- Test 1 - Homework - Assignment - Quizzes - Final exam
1.2	Solve basic economic dispatch problem.	1	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
1.3				
2.0	**Skills**			
2.1	Design power flow system.	2	- Lectures - Tutorials	- Quizzes - Test 1 - Final exam
2.2	Estimate fault currents.	6	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
2.3	Analyze the power system stability.	6	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Final exam
2.4	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team player in executing related projects with	5	- Lectures - Tutorials	- Mini Project

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	imposed design constraints.			
3.2			-	
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to interconnected power systems, components, and models.	6
2.	Optimal dispatch of generation.	8
3.	Formation of power system matrices.	6
4.	Power flow analysis.	12
5.	Symmetrical three-phase faults.	8
6.	Symmetrical components	8
7.	Unbalanced fault analysis.	6
8.	Power system stability.	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Power System Analysis, John J. Grainger and William D. Stevenson, Jr.-McGraw-Hill, 1994.

Supportive References	Husain, "Electrical power Systems", CBS Publisher & Distributors, 1994.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023
TP-153

Course Specification
(Bachelor)

Course Title: VLSI Design	
Course Code: 434-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 5

E. Learning Resources and Facilities 5

F. Assessment of Course Quality 6

G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
Introduction to Integrated Circuit, Lambda Design Rules, NMOS and CMOS Inverters, NMOS and PMOS transistors, P -Well process, N -Well process, CMOS logic, CMOS Technologies, CMOS fabrication and Layout, Integrated Circuit Design using Verilog/VHDL.					
5. Pre-requirements for this course (if any):					
Electronics (2): 332-ELE-3					
6. Co-requisites for this course (if any):					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Lambda Design Rules for NMOS and CMOS Inverters. 2. NMOS and PMOS transistors, P -Well process, N -Well process. 3. CMOS logic, CMOS Technologies. 4. CMOS fabrication and Layout. 5. Integrated Circuit Design using Verilog/VHDL.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Apply knowledge to understand the basic design rules.	1	- Lectures - Tutorials	- Mid Term1 & 2 - Final Exams - Quizzes
1.2				
1.3				
2.0	**Skills**			
2.1	Design basic gates using the CMOS.	2	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 - Final exam
2.2	Distinguish among different design technologies.	2	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 - Final exam
2.3	Build basic logic circuits using VHDL.	6	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Test 2 - Final exam
2.4				
3.0				
3.1				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Integrated Circuits and Design Rules	8
2.	NMOS and CMOS Inverters	12
3.	NMOS and PMOS transistors	10
4.	P -Well process, N -Well process	4
5.	CMOS technologies	10
6.	CMOS logic, CMOS fabrication and Layout	8
7.	Integrated Circuit Design using Verilog/VHDL.	8
8.		
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	- "Introduction To VLSI Circuits and Systems", By John P. Uyemura 1st Edition, 2010 Wiley Pub. - Pucknell, "Basic VLSI Design", Prentice Hall Publication, 3rd Edition 1995.

Supportive References	"CMOS VLSI Design: A Circuits and Systems Perspective" By David Westen Neil H.E. Harris 3rd Edition, Addison-Wesley Pub.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	PsPice Software

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Design and Analysis of Integrated Circuits
Course Code:	435-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	1
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: ($9^{th}/5^{th}$)					
4. Course general Description:					
Integrated circuit devices and concepts. Review of single stage BJT and FET amplifiers. Biasing circuits, current mirrors and sources. Mixed mode integrated circuit devices and concepts. Current mirrors and sources. Design of transconductance amplifier. Design of input stages, differential pairs, active loads, gain stages and level shifting. Output stages, power dissipation. Low voltage design, low power design. Fully differential operation. High performance amplifier design. Analysis and design of typical ideal op-amp circuits. Voltage and current references. Noise Analysis. Distortion analysis.					
5. Pre-requirements for this course (if any)**:**					
332-ELE-3 Electronics (2)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. To learn the fundamentals of Integrated circuit design. 2. To be familiar with the Design of the transconductance amplifier 3. To be familiar with the Design of input stages, differential pairs, active loads, gain stages, and level shifting. 4. To be familiar with Fully differential operation. High-performance amplifier design 5. To learn fundamentals of Analysis and design of typical ideal op-amp circuits					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	Apply Knowledge of single stage BJT and FET amplifiers to solve IC problems	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2				
1.3				
2.0	Skills			
2.1	Design of transconductance amplifier.	2	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
2.2	Analysis and design of typical op-amp circuits	6	- Lectures - Tutorials	- Assignment - Mini Project - Test 2 Final exam
2.3	Design of input stages, differential pairs, active loads, gain stages and level shifting.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Integrated circuit devices and concepts. Review of single stage BJT and FET amplifiers. Biasing circuits, current mirrors and sources	10
2.	Advanced modeling and 2nd order effects of transistors and single stage amplifiers. Current mirrors and sources.	10
3.	Design of transconductance amplifier. Design of input stages, differential pairs, active loads, gain stages and level shifting.	10
4.	Output stages, power dissipation. Low voltage design, low power design. Fully differential operation.	10
5.	High performance amplifier design	8
6.	Analysis and design of typical ideal op-amp circuits. Voltage and current references. Noise Analysis. Distortion analysis.	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Mini Project and Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	Analysis and Design of Analog Integrated Circuits, 6th Edition, Gray, Hurst, Lewis, Meyer, Wiley, 2024
Supportive References	Microelectronic Circuits by Sedra Smith, fifth edition, publisher oxford university press, 2004.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**

REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Introduction to Micro and Nano-Electronics
Course Code:	437-ELE-3
Program:	Bachelor of Science in Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	1
Last Revision Date:	03/03/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 6

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
Introduction to microfabrication techniques (photo-lithography, etching, deposition, thermal processes, CVD, Ion implantation,etc.). CMOS manufacturing from old to current technologies, including challenges and future developments. Introduction to Micro Electro Mechanical Systems (MEMS), Nanotechnology and Nanomaterials. Innovative technologies (Flexible/Stretchable electronics, Energy Micro- and Nano-harvesters).					
5. Pre-requirements for this course (if any)**:**					
332-ELE-3 Electronics (2)					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. To learn the fundamentals of microfabrication techniques and its limitations. 2. To be familiar with the CMOS manufacturing. 3. To be familiar with Micro Electro Mechanical Systems (MEMS). 4. To be familiar with Nanotechnology and Nanomaterials.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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**			
1.1	To identify, formulate, and solve complex engineering related CMOS manufacturing techniques.	1	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.2	Apply Knowledge to learn the fundamentals of microfabrication techniques.	7	- Lectures - Tutorials	- Assignment - Quizzes - Test 1 Final exam
1.3				
2.0	Skills			
2.1	An ability to apply engineering design to produce solutions for Micro Electro Mechanical Systems.	2	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.2	Analysis and design of Nanotechnology and Nanomaterials.	6	- Lectures - Tutorials	- Assignment - Quizzes - Test 2 Final exam
2.3				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1				
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to microfabrication techniques (photo-lithography, etching, deposition, thermal processes, CVD, Ion implantation etc.)	15
2.	CMOS manufacturing from old to current technologies, including challenges and future developments.	15
3.	Introduction to Micro Electro Mechanical Systems (MEMS), Nanotechnology and Nanomaterials.	15
4.	Innovative technologies (Flexible/Stretchable electronics, Energy Micro- and Nano-harvesters).	15
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Quizzes	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			
6.			

*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	S.A. Campbell, Fabrication Engineering at the Micro and Nanoscale, Oxford, 2008, 3rd Edition
Supportive References	• M. Madou, Fundamentals of Microfabrication, CRC Press, 2002 • N. Maluf, An Introduction to Microelectromechanical Systems Engineering, Artech House Publisher, 2nd Edition, 2004.
Electronic Materials	NA
Other Learning Materials	Lecture notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	Laptops Data show
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of teacher during class and assessed him by filling the peer reviewer assessment form.
Effectiveness of Students assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	- A questionnaire is given to the students for feedback of syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**

REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

— (Bachelor)

Course Title:	Microwave Engineering
Course Code:	441-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: ($9^{th}/5^{th}$)					
4. Course general Description:					
Theory, analysis and design of transmission lines, transmission line propagation, impedance matching techniques using Smith chart, waveguides, microwave network analysis using S-Parameters, analysis and design of passive and active components, measurement techniques and application of microwave systems.					
5. Pre-requirements for this course (if any)**:**					
Electromagnetism (2): 340-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Describe the impacts and applications of microwave circuits. 2. Analysis and design of transmission lines. 3. Explain transmission line propagation. 4. Analyze impedance matching techniques using the Smith chart. 5. Study and analyze waveguides. 6. Study and investigate microwave network analysis using S-Parameters. 7. Analysis and design of passive and active components. 8. Explain and perform the measurement techniques. 9. Describe the applications of microwave systems. 10. Utilize computer simulation tools in solving problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Describe the basic principles, impacts, and applications of microwave circuits.	1	- Lectures - Tutorials	- Test 1 - Test 2 - Final Exam - Quizzes
1.2	Apply various microwave circuit analysis techniques in solving problems.	7	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Test 1 - Test 2 - Final Exam - Quizzes
1.3				
2.0	**Skills**			
2.1	Perform the microwave measurement techniques.	6	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Homework - Assignment - Quizzes - Test 2 - Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Design active and passive microwave components.	2	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Group project. - Oral presentation - Final exam
2.3	Utilize computer simulation tools in solving problems related to applications of microwave circuits.	6	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Homework - Assignment - Quizzes - Test 2 - Final exam
2.4	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials - 3D EM simulator - MATLAB	Presentation
3.0				
3.1	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials - 3D EM simulator - MATLAB	Mini project
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Reports
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Transmission lines	10
2.	Smith Chart	6
3.	Waveguides	10
4.	Microwave Network Analysis	4
5.	Matching Networks	4
6.	Microwave Filter Design	8
7.	Microwave Amplifier Design	8

8.	Microwave Measurements	4
9.	Application of Microwave Systems	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Pozar, D. M. (2011). Microwave Engineering. 4th Edition. New York: John Wiley & Sons.
Supportive References	- Awang, Z. (2013). Microwave System Design. Last Edition. New York: Springer. - Kizer, G. (2013). Digital Microwave Communication: Engineering Point-to-Point Microwave Systems. Last Edition. New Jersey: John Wiley & Sons. - Collier, R. L. & Skinner, A. D. (2007). Microwave Measurements. 3rd Edition. Herts: Institution of Engineering and Technology.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- 3D EM simulator such as Computer Simulation Technology. - MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students

Items	Resources
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Antenna and Wave Propagation
Course Code:	442-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
Introduction to antennas, theory of wave propagation, fundamental parameters of antenna, radar range equation, half-wave dipole antenna, antenna arrays, planar antennas, broadband antennas, methods of antenna measurements, matching techniques, principle of designing different types of antenna and antenna arrays.					
5. Pre-requirements for this course (if any)**:**					
Electromagnetism (2): 344-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					

After completing this course, the students should be able to:

1. Explain various types of antennas and applications.
2. Understand the fundamental parameters of the antenna.
3. Realize the radar range equation, a half-wave dipole antenna, antenna arrays, planar antennas, and broadband antennas.
4. Explain methods of antenna measurements.
5. Understand matching techniques.
6. Describe the principles of designing different types of antennae, and the design of antenna arrays.
7. Explain and understand the theory of wave propagation.
8. Construct an antenna system to satisfy the requirements of a wireless system.
9. Utilize computer simulation tools in solving problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Explain various types of problems and propagation theory in a telecommunication system.	1	- Lectures - Tutorials	- Test 1 - Homework - Assignment - Quizzes - Final exam
1.2	Summarize the principle of sustainable design of antenna and wave propagation.	1	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Quizzes - Test 2 - Final exam
1.3				
2.0	**Skills**			
2.1	Design an antenna system or component to satisfy the requirements of a wireless system.	2	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Quizzes - Test 1 - Final exam - Mini Project
2.2	Utilize computer simulation tools in	6	- Lectures - Tutorials	- Group project.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	solving antenna-related problems.		- 3D EM simulator - MATLAB	- Oral presentation - Final exam
2.3	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Mini Project - Presentation
2.4			-	-
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Reports
3.2	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Antenna Basic Concept	4
2.	Antenna Parameters	8
3.	Dipole Antenna	8
4.	Antenna Types	8
5.	Antenna Array	8
6.	Antenna Measurement	8
7.	Antenna in Systems	8
8.	Wave Propagation	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Das, S.K., and Das, A. (2013). Antenna and Wave Propagation, Last Edition. New Delhi: Tata McGraw Hill Education Private Limited
Supportive References	- Carr, J. J., and Hippisley, G. W. (2011). Practical Antenna Handbook. 5th Edition, New York: McGraw-Hill. - Pozar, D. M. (2011). Microwave Engineering. 4th Edition. New York: John Wiley & Sons. - Granatstein, V. L. (2012). Physical Principle of Wireless Communications. 2nd Edition, Boca Raton: CRC Press.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program. - 3D EM simulator.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Embedded Systems
Course Code:	446-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course covers the main elements of embedded systems design. Emphasis given includes hardware and firmware design, hardware selection, hardware testing, development tools and software, firmware development and firmware debugging.					
5. Pre-requirements for this course (if any)**:**					
Introduction to Microprocessor: 354-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Analyze and design embedded systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30

2.	Laboratory/Studio	15
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Identify embedded systems and their components and characteristics.	1	- Lectures - Tutorials - MATLAB	- Mid Term1 & 2, - Final Exams - Quizzes
1.2	Identify Arduino microcontroller	1	- Lectures - Tutorials - MATLAB	- Mid Term1 & 2, - Final Exams - Quizzes
1.3				
2.0	**Skills**			
2.1	Design embedded systems using Arduino	2	- Lectures - Tutorials - MATLAB	- Lab Exam - Assignment - Mini Project - Test 1 - Final exam
2.2	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials - MATLAB	- Presentation
2.3				
2.4				
3.0				
3.1	Perform as an effective team-player in executing the related project with imposed design constraints.	5	- Lectures - Tutorials - MATLAB	Mini project

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Report
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to embedded systems.	10
2.	Microprocessors and microcontrollers	10
3.	Memory.	8
4.	Interfacing.	8
5.	Introduction to Arduino.	8
6.	Programming using Arduino.	8
7.	Designing embedded systems using Arduino.	8
8.		
9.		
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	15 %
2.	Test 2	Week 12	15 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	5 %
4.	LAB course work	Every Week	15 %
5.	LAB Final	Week 14	15 %
6.	Final Exam	At the end of the semester as determined by the academic calendar	35 %

*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	- Embedded System Design: A unified Hardware/Software Introduction, Frank Vahid and Tony Givargis. Wiley. 2001 - Designing Embedded Systems with Arduino, Tianhong Pan and Yi Zhu, Springer, 2018
Supportive References	- Ganguly, A.K. (2013). Embedded System: Design, Programming and Applications. Oxford: Alpha Science Intl Ltd. - Iniewski, K. (2012). Embedded System: Hardware, Design, and Implementation. New Jersey: John Wiley & Sons. - Sanchez, J. & Canton, M.P. (2012). Embedded Systems Circuits and Programming. Boca Raton: CRC Press
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023
TP-153

Course Specification

(Bachelor)

Course Title:	Data Communications and Networks
Course Code:	447-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
Network Architectures. Network Layers: OSI Model and TCP/IP Model. Physical Layer Protocols and Digital Transmission Fundamentals. Data Link Layer Protocols. Network Layer Protocols: IP Protocols. Medium Access Control systems. Packet Switching and Circuit Switching. Routing in Packet Switching Network Architectures. Network Layers: OSI Model and TCP/IP Model. Physical Layer Protocols and Digital Transmission Fundamentals. Data Link Layer Protocols. Network Layer Protocols: IP Protocols. Medium Access Control Systems. Packet Switching and Circuit Switching. Routing in Packet Switching. Network security.					
5. Pre-requirements for this course (if any)**:**					
Digital Communication: 444-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Build an understanding of the fundamental concepts of computer networking. 2. Introduce students to the evolution of computer networks and the concepts of data communication. 3. Introduce students to the general principles of network design and compare the different network topologies. 4. Introduce students to the wireless Local Area Networks. 5. Familiarize the student with the basic taxonomy and terminology of the computer networking area. 6. Introduce the student to advanced networking concepts, preparing the student for entry into Advanced courses in computer networking.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90

No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	15
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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			
1.1	Identify problems regarding computer and network security, and their impact on society.	1	- Lectures - Tutorials - MATLAB	- Homework - Assignment - Quizzes - Final exam
1.2	Identify, formulate, and solve engineering problems related to telecommunications Networks.	1	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 2 - Final exam
1.3				
2.0	Skills			
2.1	Design of telecommunication systems.	2	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 1 - Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Use techniques, and skills of modern programming tools in the engineering practice of Telecommunication Networks.	6	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 2 - Final exam
2.3			-	-
2.4			-	-
3.0	**Values, autonomy, and responsibility**			
3.1			-	-
3.2			-	
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Communication Theory Review	4
2.	TCP/IP Suite & ISO OSI Model	8
3.	Logical (IP) Addressing	4
4.	Internet Protocol	8
5.	Network Layer Protocols	8
6.	Routing	4
7.	Wired LAN: Ethernet	4
8.	Wi-Fi Networks	4
9.	Connecting and Extending LANS	4
10.	WANs	4
11.	TELEPHONE NETWORK: Network Elements, Multiplexing, Switching, Signaling, Traffic Analysis, Cellular Networks	4
12.	Network security	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	15 %
2.	Test 2	Week 12	15 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	5 %
4.	LAB course work	Every Week	15 %
5.	LAB Final	Week 15	15 %
6.	Final Exam	At the end of the semester as determined by the academic calendar	35 %

*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	Data Communications and Networking, B. A. Forouzan, S. C. Fegan, McGraw-Hill, 5th Edition,2013
Supportive References	- Albert Leon-Garcia and IndraWidjaja, Communication Networks: FundamentalConcepts and Key Architectures, 2nd ed., McGraw-Hill, 2004. - Peterson & Davie, "Computer Networks, A Systems Approach", 3rd ed, Harcourt, 2005 - Andrew S. Tanenbaum, "Computer Networks", 4th ed., Prentice Hall, 2003. - Bertsekas and Gallagher “Data Networks,” PHI, 2000
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Wireless Communications
Course Code:	448-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
Introduction to wireless communications, Channel models, large- and small-scale fading, Diversity, cellular system analysis (frequency planning, capacity, sectorization, etc.), Link budget analysis, Multiple access techniques (TDMA, FDMA, CDMA), technology and applications of satellite communications, Standards of wireless communications.					
5. Pre-requirements for this course (if any)**:**					
Digital Communication: 444-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Explain the basic concepts of wireless communications. 2. Describe channel models. 3. Understand large- and small-scale fading. 4. Explain and understand diversity. 5. Understand cellular system analysis (frequency planning, capacity, sectorization, etc.). 6. Recognize link budget analysis. 7. Explain multiple access techniques (TDMA, FDMA, CDMA). 8. Describe the technology and applications of satellite communications. 9. Understand the standards of wireless communications. 10. Evaluate problems related to mobile radio and satellite communication. 11. Explain the mobility management of mobile radio communication systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Explain the mobility management of mobile radio communication system.	1	- Lectures - Tutorials	- Test 1 - Homework - Assignment - Quizzes - Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Evaluate problems related to mobile radio and satellite communication.	6	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Quizzes - Test 1 - Test 2 - Final exam
2.2	Develop a system using components and processes for the need of wireless communication systems design.	2	- Lectures - Tutorials - 3D EM simulator - MATLAB	- Group project. - Oral presentation - Final exam
2.3	Communicate effectively to	3	- Lectures - Tutorials	- Mini Project - Presentation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	perform the presentation.			
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Reports
3.2	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to wireless communication systems	4
2.	Fundamental of Cellular System Design	8
3.	Architecture and Access Network Planning	8
4.	Multipath Fading and Dispersion	8
5.	Introduction of Orbital Satellite System	8
6.	Propagation and Link Budget	8
7.	Satellite Services	8
8.	Mobility management of wireless communication systems	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Assignments/Quizzes/group projects and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Theodore S. Rappaport (2001). Wireless Communications Principles and Practice. 2nd Edition, Prentice Hall.
Supportive References	- Kolawole, M. O. (2013). Satellite Communication Engineering. 2nd Edition, Boca Raton: CRC Press. - Montenbruck, O. & Grill, E. (2011). Satellite Orbits: Model, Methods and Applications. Last Edition. New York: Springer. - Maral, G., Bousquet, M. & Sun, Z. (2010). Satellite Communications Systems: Systems, Techniques, and Technology. 5th Edition. New York: John Wiley & Sons.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Digital Image Processing	
Course Code: 451-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 7
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
Fundamentals; review of DSP algorithms such as DFT; intensity transforms, frequency domain filtering; image restoration and reconstruction; color image processing; multiresolution processing; image compression; morphological image processing.					
5. Pre-requirements for this course (if any)**:**					
Signal and System Analysis: 242-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Study the fundamentals of digital image processing. 2. Apply image transform. 3. Categorize and apply image enhancement techniques. 4. Analyze image restoration techniques and methods. 5. Classify and apply Image compression and Segmentation.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	Lectures	30
2.	Laboratory/Studio	15
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Identify the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.	1	- Lectures - Tutorials - MATLAB	- Test 1 - Homework - Assignment - Quizzes - Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Design spatial-domain and frequency-domain image filtering	2	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 1 - Final exam - Mini Project
2.2	Apply frequency transformations, such as DFT and DCT for images	6	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 2 - Final exam
2.3	Design a filter to restore the noisy image.	2	- Lectures - Tutorials - MATLAB	- Lab Exam - Lab Report - Quizzes - Test 2 - Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Mini Project - Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Report
3.2	Perform as an effective team-player in executing related project with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	The digital image processing field: Introduction, definitions, and applications	4
2.	Image fundamentals: Models, sampling, quantization, and basic operations	6
3.	1-D and 2-D Discrete Fourier Transform and properties of DFT	6
4.	Image Enhancement: Background, Point processing, Histogram equalization and specification	6
5.	Intensity Transformations and spatial domain filtering: Smoothing, Median, & Sharpening. Frequency Domain Filtering: Low & high-pass	8
6.	Frequency Domain Filtering: Low & high-pass	6
7.	Image restoration and reconstruction	6
8.	Image compression	6
9.	Image segmentation	6
10.	Object recognition	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	15 %
2.	Test 2	Week 12	15 %
3.	Assignments/Quizzes/group projects and presentation	Every chapter	5 %
4.	LAB course work	Every Week	15 %
5.	LAB Final	Week 15	15 %
6.	Final Exam	At the end of the semester as determined by the academic calendar	35 %

*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	Digital Image Processing, R. Gonzalez and R. Woods, Pearson; 4th edition, 2017.
Supportive References	- Gonzalez, Rafael C., Eddins, Steven L., Woods, Richard E, Digital Image Processing Using MATLAB, 1st Ed., Pearson Prentice-Hall, 2004. - Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing, Analysis, and Machine Vision, Thomson Learning, 2008, ISBN 0-495-08252-X.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Digital Signal Processing	
Course Code: 456-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 6
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
Review of discrete-time signals and systems; The Discrete-Time Fourier transform, Fast Fourier Transform, Z Transform, Recursive and no recursive digital filters design and realization; Decimation and interpolation; Applications of digital signal processing in communications.					
5. Pre-requirements for this course (if any)**:**					
Signals and Systems Analysis: 242-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. **Understand and use different theories and tools for digital signal processing.** 2. Design and analyze digital filters.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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			
1.1	Apply knowledge of sampling theorem to reconstruct signals.	1	- Lectures - Tutorials	- Homework - Assignment - Quizzes - Final exam
1.2	Define and execute different discrete transform techniques	7	- Lectures - Tutorials	- Lab Report - Quizzes - Test 2 - Final exam
1.3	Execute the theories and properties of discrete LTI systems	7	- Lectures - Tutorials	- Assignment - Quizzes - Midterm exam - Final exam
2.0	Skills			
2.1	Design different types of system responses.	2	- Lectures - Tutorials - Simulation	- Quizzes - Test 2 - Final exam - Mini project
2.2	Design analog and digital filters.	2	- Lectures - Tutorials - Simulation	- Quizzes - Test 2 - Final exam - Mini project
2.3	Communicate effectively to	3	- Lectures - Tutorials	Presentation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	perform the presentation.			
2.4				
3.0				
3.1	Perform as an effective team player in executing related projects with imposed design constraints.	5	- Lectures - Tutorials	Mini project
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	- Lectures - Tutorials	- Mini project - Reports
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Review of discrete-time signals and systems;	4
2.	Tabular method of convolution; correlation and its properties;	8
3.	The Discrete-Time Fourier transform: its definition, implementation of the transform technique in some basic and advanced sequences, Its application	8
4.	Fast Fourier Transform and Z Transform; Region of convergence (ROC), convolution using z-transform	12
5.	Analyze different discrete-time system response	8
6.	Recursive and non-recursive digital filters design and realization;	12
7.	Sampling theorem, applications of digital signal processing in communications;	8
8.		
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Test 1	Week 6	20 %
2.	Test 2	Week 12	20 %
3.	Assignments/Quizzes/group project and presentation	Every chapter	10 %
4.	Final Exam	At the end of the semester as determined by the academic calendar	50 %
5.			

*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	Mitra, "Digital Signal Processing: A Computer Based Approach", Mc Graw Hill, 4th Edition 2010.
Supportive References	Vinay K. Ingle, John G. Proakis, "Digital Signal Processing using MATLAB" Cengage Learning, 4th Edition, 2016
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during

Assessment Areas/Issues	Assessor	Assessment Methods
		class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Applied Control
Course Code: 463-ELE-3
Program: Electrical Engineering
Department: Electrical Engineering
College: Engineering
Institution: Najran University
Version: 4
Last Revision Date: 28/2/2024

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 6
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (3,0,1) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9^{th}/5^{th})					
4. Course general Description:					
Basics of system modeling and analysis; PID controller design; Transducers and actuators; Real-time control; Control applications (power systems, robotics, etc.), Introduction of Programming Logic Controller (PLC).; Control design project.					
5. Pre-requirements for this course (if any)**:**					
Automatic Control: 361-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					

After completing this course, the students should be able to:

1. Define and classify applied control strategies for industrial applications.
2. Analyses of different control methods such as root locus, frequency domain, state space for different electrical and mechanical systems.
3. Analyses of different control methods such as root locus, frequency domain, state space for different electrical and mechanical systems.
4. Model and analyze different electrical and mechanical systems.
5. Compute the PID controller parameters via MATLAB Simulink and control toolbox.
6. Introduction of Programming Logic Controller (PLC).

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		60

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**			
1.1	Introduction of Programming Logic Controller (PLC)	1	- Lectures - Tutorials	- Quizzes - Test 2 - Final exam
1.2				
1.3				
2.0	**Skills**			
2.1	Analyze different control methods such as root locus, frequency domain for different electrical and mechanical systems.	6	- Lectures - Tutorials	- Quizzes - Test 1 - Test 2 - Final exam
2.2	Design of PID, and lead-lag controllers using various control methods.	2	- Lectures - Tutorials	- Test 1 - Test 2 - Final exam - Mini Project
2.3	Communicate effectively to perform the presentation.	3	- Lectures - Tutorials	- Mini Project - Presentation
2.4				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Recognize ethical and professional responsibilities in engineering situations and make informed judgments	4	Lectures - Tutorials	- Mini project - Reports
3.2	Compute the PID controller parameters via MATLAB Simulink and control toolbox	5	- Computer programming tools (MATLAB)	Mini project
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to control and its industrial applications.	8
2.	Modeling and analysis of dynamic models of different systems such as mechanical and electrical systems including models of motor position and speed, and cruise control systems.	12
3.	Analyze different control methods such as root locus, frequency domain, state-space for different electrical and mechanical systems.	12
4.	Design of PID, and lead-lag control strategies.	12
5.	Introduction of Programming Logic Controller (PLC).	12
6.	MATLAB for control applications	4
7.		
8.		
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid 1	Week 6	15 %
2.	Mid 2	Week 12	15 %
3.	Mini project	Week 13	10 %
4.	Assignments/Quizzes/group project and presentation	Every chapter	10 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	Final Exam	At the end of the semester as determined by the academic calendar	50 %

*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	Modern control systems. Richard C. Dorf, Robert H. Bishop. 13th ed. 2016.
Supportive References	Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall 2010.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**

2023
TP-153

Course Specification
(Bachelor)

Course Title: Introduction to Robotics	
Course Code: 464-ELE-3	
Program: Electrical Engineering	
Department: Electrical Engineering	
College: Engineering	
Institution: Najran University	
Version: 4	
Last Revision Date: 28/2/2024	

Table of Contents

A. General information about the course: 3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4
C. Course Content 5
D. Students Assessment Activities 5
E. Learning Resources and Facilities 5
F. Assessment of Course Quality 6
G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
This course provides an overview of the robotics, basic elements of the robot, basics of the robot design, programming and vision in robotics and applications of robots in biomedical, deep water and manufacturing.					
5. Pre-requirements for this course (if any)**:**					
Automatic Control: 361-ELE-3					
6. Co-requisites for this course (if any)**:**					
NA					
7. Course Main Objective(s):					
After completing this course, the students should be able to: 1. Identify the robotic elements and spatial description & transformations. 2. To learn the fundamentals and design of robots. 3. To be familiar with applications of robotics in the industry. 4. Design and simulate robots of various degrees of freedom.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	50
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		
5	Lab Work	30	50

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		60

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**			
1.1	Identify the main element of robot design	1	Lectures	- Mid Exam 1 - Quiz - Final exam
1.2	Identify the spatial description and transformations	1	Lectures	- Mid Exam 1 - Quiz - Final exam
1.3				
2.0	**Skills**			
2.1	Design kinematic and dynamic response of robotic systems	2	Lectures	- Mid Exam 1 - Mid Exam 2 - Final exam - Mini Project
2.2	Simulate robots of various degrees of freedom	6	Lab demonstration & simulation	- Lab Report - Quiz - Final Exam
2.3	Communicate effectively to perform the presentation.	3	- Lectures - Simulation	- Mini Project Presentation
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1	Perform as an effective team-player in executing related	5	- Lectures - Simulation	Mini Project

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	project with imposed design constraints.			
3.2				
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	An overview of robots	2
2.	Spatial description and transformations	6
3.	Robot manipulator kinematics	6
4.	Robot manipulator dynamics	6
5.	Velocity and torque parameters	4
6.	Manipulator-mechanism design	4
7.	Modern trends and applications of robots	2
8.	Robot Simulations	30
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Random	10 %
2.	Midterm 1 Exam	Week 6	15 %
3.	Midterm 2 Exam	Week 12	15 %
4.	Lab Report	Week 13	5 %
5.	Mini Project	Week 13	5 %
6.	Final Exam (Practical)	At the end of the semester as determined by the academic calendar	20 %
7.	Final Exam (Theoretical)	At the end of the semester as determined by the academic calendar	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	Introduction to Robotics, mechanics and control by John J. Graig, Pearson, 4th Edition, 2017.
Supportive References	- Saha, S.K., Introduction to Robotics, 2nd Edition, 2014, Tata McGraw-Hill. - Introduction to Robotics by P. J. McKerrow, Edition 2008, Wiley. - Introduction to AI Robotics by R. R. Murphy, Edition 2000, MIT Press.
Electronic Materials	http://lib.nu.edu.sa/digitallibbrary.aspx
Other Learning Materials	- MATLAB Program. - Robot design and application videos from YouTube

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for maximum 20 students
Technology equipment (projector, smart board, software)	- Laptops - Data show - MATLAB
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer reviewer	The peer reviewer will monitor the teaching method of the teacher during class and assess him by filling in the peer reviewer assessment form.
Effectiveness of Students' assessment	Students	Students evaluate the course instructor through survey form and through edugate.
Quality of learning resources	Students	A questionnaire is given to the students for feedback on syllabus.
The extent to which CLOs have been achieved	Teaching staff	CLOSO Software
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Electrical Engineering Department Council
REFERENCE NO.	14450909-0486-00015
DATE	21/3/2024

2023

TP-155

Field Experience Specification

Course Title:	Cooperative Training
Course Code:	490-ELE-3
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Field Experience Version Number:	2
Last Revision Date:	28/2/2024

Table of Contents

A. Field Experience Details: 3
B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods 3
C. Field Experience Administration 5
D. Training Quality Evaluation 7
E. Specification Approval Data 8

A. Field Experience Details:

1. Credit hours: 3		
2. Level/year at which Field Experience is offered: 10th/5th		
3. Time allocated for Field Experience activities		
(15) Weeks	(75) Days	(600)Hours
4. Corequisite (or prerequisites if any) to join Field Experience		
At least complete 120 Credit hours		
5. Mode of delivery		
☒ In-person/onsite	☐hybrid (onsite/online)	☐Online

B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
1.0	**Knowledge and understanding**				
1.1	Apply design concepts and skills learned from previous courses in the fieldwork to solve problems related to Electrical Engineering.	2	• Independent learning • Cooperative learning	Practical test Field report Oral test Presentation	Teaching Staff Field Supervisor
1.2	Analyze and interpret the machine drawings and its operations.	6	• Independent learning • Cooperative learning	Field report	Teaching Staff Field Supervisor
2.0	**Skills**				
2.1	Deliver and present the work field reports effectively through written and oral communication.	3	• Independent learning • Cooperative learning	Oral test Presentation	Teaching Staff Field Supervisor
2.2	Communicate effectively within the working environment in a teamwork.	5	• Independent learning • Cooperative learning	Oral test Presentation	Teaching Staff Field Supervisor

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
2.3	Follow safety regulations and professional responsibility in the fieldwork and office work to make proper judgements.	4	• Independent learning Cooperative learning	Practical test Oral test Presentation	Teaching Staff Field Supervisor
3.0	**Values, autonomy, and responsibility**				
3.1					
3.2					
...					

*Assessment methods (i.e., practical test, field report, oral test, presentation, group project, essay, etc.).

Assessment Responsibilities

#	Category	Assessment Responsibility
1	Teaching Staff	• Evaluate the student's performance based on weekly reports and direct feedback from the field supervisor. • Visit the trainee students in the field training at least once per period of training. • Prepare the field experience report after completing the requirements of the field training. • List recommendations for continuous improvement.
2	Field Supervisor	• Supervising the students during the field work. • Follow and monitor the student's performance and progress. • Evaluate the students and report to the teaching staff after completing the requirements of the field training.
3	Others (specify)	None.

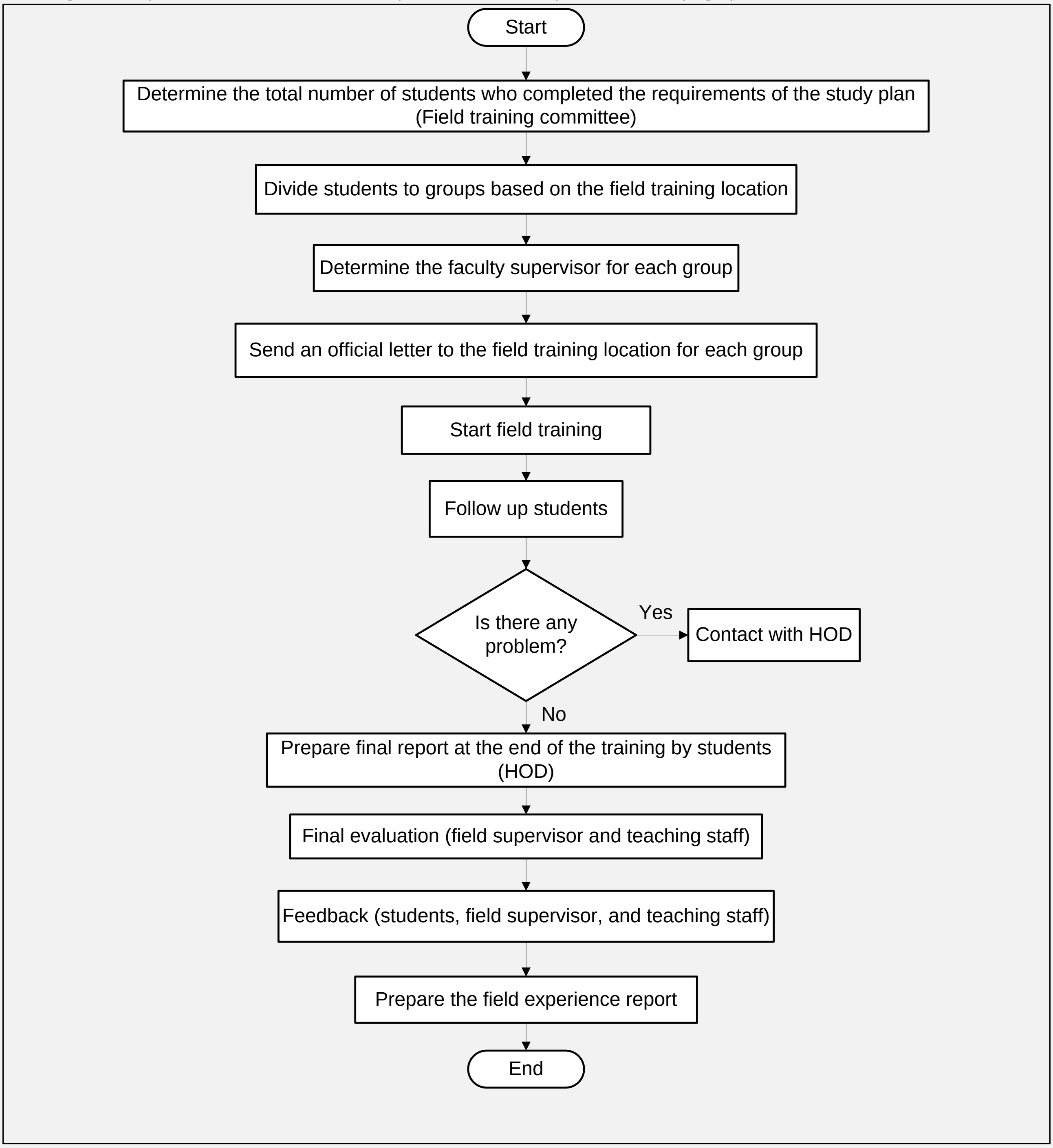
Students Assessment Timetable

#	Assessment task*	Assessment timing (Week)	Percentage of Total Assessment Score
1	Final training report	8^{th} week	20%
2	Defense of training	8^{th} week	20%
3	Supervisor of training	Weekly	20%
4	Training Evolution (Form No. 4)	8^{th} week	20%
5	Logbook	Weekly	20%
	Total		**100%**

C. Field Experience Administration

1. Field Experience Flowchart for Responsibility

Including units, departments, and committees responsible for field experience identifying by the interrelations.



2. Distribution of Responsibilities for Field Experience Activities

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	√	√	√		
Selection of supervisory staff	√	√			
Provision of the required equipment				√	√
Provision of learning resources	√	√		√	√
Ensuring the safety of the site				√	√
Commuting to and from the field experience site	√	√	√	√	√
Provision of support and guidance		√		√	√
Implementation of training activities (duties, reports, projects ...)		√		√	√
Follow up on student training activities		√		√	√
Monitoring attendance and leave				√	√
Assessment of learning outcomes	√	√		√	√
Evaluating the quality of field experience		√	√		√
Others (specify)					

3. Field Experience Location Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
Saudi Electricity Company	• Availability of resources. • Availability of equipment. Availability of laboratories (if any).	Must follow safety standards, regulations, and instructions of every field experience location.
Saudi Telecom Company (STC)		
Najran Municipality		
Projects Management Companies at Najran University		
Any other private company in the field of electrical engineering		

*E.g. provides information technology, equipment, laboratories, halls, housing, learning sources, clinics … etc.
** E.g. Criteria of the institution offering the training or those related to the specialization, such as safety standards, dealing with patients in medical specialties … etc.

4. Decision-Making Procedures for Identifying Appropriate Locations for Field Experience

The training field committee in the program will identify the appropriate locations for field experience based on the following points:

1. Feedback from the trainee students: The field trainee students can meet their academic supervisor during the official working hours or by email to submit the weekly report and to explain the work carried out in the company and difficulties if any.
2. Feedback from the teaching staff (academic supervisor): The academic supervisor should visit the trainee students in the field training at least one time per period of training to see its appropriateness for students' training.
3. Direct feedback from the field supervisor.
4. Questionnaires (trainee students, field supervisor).
5. Field experience report after completing the requirements of the field training.
6. The listed recommendations by trainee students, field supervisor, and academic supervisor.

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
The expulsion of training without compelling reasons.	Official agreement should be formalized between the college and the field training location.	Work in accordance with the conditions as given in the agreement.
Possibility of injury the trainee during the field training.	Official agreement should be formalized between the college and the field training location.	Work in accordance with the conditions as given in the agreement.

D. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of training and assessment	- Students - Company's supervisors	- A questionnaire is administered upon completing the course. - Open discussion for the students during the semester to recognize their weak points in the course
Extent of students' achievement of course learning outcomes	Academic supervisor	CLOSO program
Improvement of field training	- Students Company's supervisors	- Learning from students' feedback - Learning from company's supervisors' feedback
Quality of learning resources	Students	Questionnaire is administered by the end of every semester
Verifying standards of student achievement	- Program leader Academic supervisor	Check student's marks by the program leader of a sample of student work.

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council /Committee	**Electrical Engineering Department Council**
Reference No.	**14450909-0486-00015**
Date	**21/3/2024**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Graduation Project (2)
Course Code:	492ELE-2
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	Engineering
Institution:	Najran University
Version:	4
Last Revision Date:	28/2/2024

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 7

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2 (1,2,0) Credit hours (Theory, Lab, Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (9th/5th)					
4. Course general Description:					
The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. This is the continuation of graduation project-I, and consequently graduation project-II is supposed to be taken in the consecutive semester. Throughout the semester, the students try to implement what they proposed in graduation project-I as a group. Project students meet in class or lab weekly, segregate the work into sub-projects, and integrate the individual works to reach their target and faculty critique and suggestions. At the conclusion of the semester, students present their design projects along with the thesis to the supervising committee.					
5. Pre-requirements for this course (if any)**:**					
391-ELE-2: Graduation Project (1)					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
After completing this course the students should be able to: 1. Identify and formulate engineering problems in the area of electrical engineering. 2. Work effectively as a member of the team 3. Conduct enough literature review in the project domain. 4. Design a system, component, or process with defined constraints. 5. Solve engineering problems and implement designed solution. 6. Collect and analyze data, and draw conclusions though experiments while testing a project.					

Communicate orally and in writing the project design details in a technical report

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	54	90
2	E-learning	06	10
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

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**			
1.1	Conduct enough literature review in the project domain.	7	- Lectures - Discussion rounds	- Presentation Final Report Draft
1.2	Identify and formulate engineering problems in the area of electrical engineering	1	- Lectures - Discussion rounds	- Log book - Presentation

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Final Report Draft
1.3				
2.0	**Skills**			
2.1	Design a system, component or process with defined constraints.	2	- Lectures - Discussion rounds	- Presentation Final Report Draft
2.2	Collect and analyze data, and draw conclusions though experiments while testing a project	6	- Lectures - Discussion rounds - Computer programing tools Lab	- Presentation Final Report Draft
2.3	Solve engineering problems and implement designed solution	2	- Lectures - Discussion rounds	- Log book - Presentation Final Report Draft
2.4	Communicate orally and in writing the project design details in a technical report.	3	Discussion rounds	- Log book Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively as a member of the team.	5	- Lectures Discussion rounds	Log book
3.2	Recognize ethical and professional responsibilities in engineering situations and make informed judgments.	4	Discussion rounds	- Log book Presentation
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Prepare a road-map, collect the necessary equipment/software for the project that was proposed, planned and studied in graduation project I.	8
2.	Planning and implementation, peer review, critical comments and suggestions from the supervisor.	4
3.	Design and investigation of complex problems using proper techniques, tools and resources	8
4.	Testing, data analysis, validation and critical thinking	8
5.	Results and discussion including societal/health/safety impact	8

6.	Comparison, conclusion, recommendation and assessment on implication to society/environment	5
7.	Submit the report along with the project work to the committee	4
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Logbook**	Every week	15 %
2.	**Presentation and Poster (Assessment Panel)**	Week 16	20 %
3.	**Final Report Draft (Supervisor)**	Week 16	35 %
4.	**Final Report Draft (Assessment Panel)**	Week 16	30 %
5.			
6.			

*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	Any available books in the library related to project work.
Supportive References	The students review the literature of the project from Published research articles.
Electronic Materials	Youtube channels for project concepts
Other Learning Materials	The work is done by the students on the software related to the project (like MATLAB, Pspice, LabVIEW, Arduino)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	The department provides the classroom and Lab facilities needed by the students (maximum 3 students for each group).
Technology equipment (projector, smart board, software)	MATLAB, Pspice, LabVIEW, ARDUINO
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment	Students	- Questionnaire is administered upon completing the course syllabus - Open discussion for the students during the semester to recognize their weakness points in the course Feedback from Test 1, Test 2 and Final exam records
Evaluation of teaching	Peer reviewer	The peer reviewer will monitor a teaching session for assessment by filling the peer reviewer assessment form
Extent of students' achievement of course learning outcomes	Teaching staff	CLOSO program
Improvement of teaching	- Students - Peer reviewer	- Learning form students feedback - Learning from peer reviewer and department feedback - Learning/Using various teaching methods (lecturing, discussions, workshops, exams) - Learning/Using various teaching medias (projector, whiteboard, videos, educational visits)
Quality of learning resources	Students	Questionnaire is administered by end of every semester
Verifying standards of student achievement	- Program leader - Independent member teaching staff	Check student's marks by an independent member teaching staff/program leader of a sample of student work and remarking of tests or a sample of assignments.

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**Electrical Engineering Department Council**
REFERENCE NO.	**14450909-0486-00015**
DATE	**21/3/2024**