هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Fundamentals of Power Systems
Course Code:	EE1471
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	V3
Last Revision Date:	10-10-2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (th level, 4th year)					
4. Course general Description:					
Power system structure and components, transmission conductors and cable parameters, per-unit system, analysis of transmission and distribution lines, electrical insulators, grounding in power system, and protection system.					
5. Pre-requirements for this course (if any)**:**					
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6. Co-requisites for this course (if any)**:**					
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7. Course Main Objective(s):					

1. **Understand Power System Components:**
   Gain knowledge of the key components in power systems, including generators, transformers, transmission lines, and distribution systems, and their roles in electrical power generation and distribution.
2. **Analyze Transmission Line and Cable Parameters:**
   Learn to evaluate transmission line parameters (such as resistance, inductance, and capacitance) and cable properties that impact the efficiency of power transmission.
3. **Master the Per-Unit System:**
   Develop proficiency in using the per-unit system for simplifying complex power system calculations, improving understanding and analysis of electrical quantities.
4. **Conduct Transmission and Distribution Line Analysis:**
   Perform analytical studies on transmission and distribution lines, including voltage drops, power loss calculations, and overall performance assessment.
5. **Understand Electrical Insulators and Grounding Systems:**

Study the principles and types of electrical insulators used in power systems and learn about effective grounding methods for ensuring system safety and reliability.

6. **Examine High Voltage Surges and Protection Systems:**
   Explore the effects of high voltage surges in power systems and learn about protection mechanisms like circuit breakers and surge arresters to maintain system integrity during faults or abnormalities.

These objectives provide a foundation for understanding the critical elements of electrical power systems, focusing on both theoretical and practical aspects.

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**			
K1	Understand Power System Structure and Components	1.4	Lectures	Exams
K1	Grasp the key parameters of overhead transmission lines and underground cables	1.8	Lectures	Exams
K1	Comprehend and use the per-unit system calculations	1.3	Lectures	Exams
K2	Apply analytical techniques to evaluate transmission and distribution line performance	7.2	Lectures	Exams
2.0	**Skills**			
S1	Perform grounding, insulation, and protection Mechanisms	2.1	Lectures	Exams
S1	Conduct Power System Analyses Using Per-Unit and Line Parameters	2.1	Lectures	Exams
S1	Design and Analyze Grounding, Insulation, and Protection Systems	2.5	Lectures	Exams
3.0	**Values, autonomy, and responsibility**			
NA				

C. Course Content

No	List of Topics	Contact Hours
1	Power system structure and components	8
2	Transmission line parameters	10
3	Transmission line modelling	8
4	Underground cables	4
5	Electrical insulators	6
6	Per unit systems calculations	12
7	Distribution systems	8

8	Grounding, and protection systems	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st Mid-term exam	7th week	20%
2.	2nd Mid-term exam	14th week	20%
3.	Quizzes	6th and 12th weeks	20%
4.	Final exam	16th week	40%

*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	Glover, J. Duncan, Thomas J. Overbye, and Mulukutla S. Sarma. *Power system analysis & design*. Cengage Learning, 2017. A. A. Al-Arainy, N. H. Malik and S. M. Al-Ghuwainem, "Fundamentals of Electrical Power Engineering", King Saud University Press, Latest Edition
Supportive References	--
Electronic Materials	Computer animations and online resources supplied by the instructor.
Other Learning Materials	--

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	One classroom: fits up to 25 students with white board.
Technology equipment (projector, smart board, software)	A laptop computer connected to a projector to display PowerPoint presentations
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Indirect**
Effectiveness of Students assessment	**Students**	**Indirect**

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

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	