

## Faculty of Engineering & Technology

### High Voltage Engineering

**Information :**

**Course Code :** EPR 431

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Electrical Power Engineering

**Instructor Information :**

Title	Name	Office hours
Professor	Hanafi Mahmoud Ismail	22
Lecturer	Mohamed Ahmed El Shahat Abo Saleh	1
Assistant Lecturer	Ahmed Moreab Hussien Mohamed	16
Teaching Assistant	Mohammed Ashraf Abdulhamid Abdulfatah Seyam	

**Area Of Study :**

- Develop students' knowledge of high voltage generation, measurement and testing.
- Enable students to identify the electrical breakdown theories in different insulators
- Enhance student capabilities to analyze the different types of earthing schemes.
- Develop students' knowledge about the construction and applications of high voltage cables.

**Description :**

Advantages and limitations of using high voltages for transmission, Generation and measurement of high voltage for testing, Generation of impulse waves, The impulse generators, Specifications of high voltage laboratories, Insulators for transmission lines and substations, Insulator materials: Shapes and types, Factors affecting performance of insulators, Testing of insulators: Destructive and non-destructive insulation tests- electrical breakdown in gases, Ionization and attachment coefficients, Electro-negative gases, Electrical breakdown in liquids and solids. Corona discharge, Single and three-core cables, Electrical stresses in cables, High voltage equivalent circuits, High voltage cables, Thermal properties of cables, Earthing systems.

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	Recognize the components of extra and ultra-high voltage systems.
2 -	Recall the high voltage generation, measurement and testing procedures
3 -	Recognize different types of insulators and their applications
4 -	Identify the electrical breakdown theories in different insulators
5 -	Identify the proper earthing & grounding schemes.

**b.Intellectual Skills: :**

1 -	Analyze the electric field related to high voltage cables.
2 -	Compare the suitable earthing schemes for specific application.
3 -	Evaluate the breakdown voltage for different insulating material.

**c. Professional and Practical Skills: :**

- 1 - Prepare and present technical reports related to high voltage systems

**d. General and Transferable Skills: :**

- 1 - Effectively manage tasks, time, and resources.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Electrical breakdown theories in different insulators (gases, liquids, & solids)	14	8	6
Different insulators for overhead transmission lines and substations	14	8	6
Single and 3-core cables Electrical stresses cables	14	8	6
Calculation of different grounding & earthing schemes	12	8	4
High voltage generation, measurement and testing	21	13	8

**Teaching And Learning Methodologies :**

Interactive Lecture

Problem-Based Learning

Reports

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	15.00		
Final-term examination	40.00		
Mid- Exam I	15.00		
Mid- Exam II	15.00		
Performance	5.00		
Quizzes	10.00		

**Recommended books :**

- 1) Farouk A.M. Rizk & Giao N. Trinh %High Voltage Engineering-%CRC Press; 2014
- 2) E. Kuffel, W.S. Zaengl & J. Kuffel, %High Voltage Engineering Fundamentals, 2nd ed.-%Butterworth-Heinemann, 2000.
- 3) Naidu, M.S., "High Voltage Engineering", Tata Mc Graw Hill Co., 1982.
- 4) Abdel Salam, M., Anis, H., El-Morshedy, A., and Radwan, R., "High Voltage Engineering", Marcel Dekker Inc., 2000.