SYLLABUS

1. **Course name:** Power Supply System Engineering
2. **Course code:** ELPS330345
3. **Credits:** 3 (3/0/6)

   Duration: 15 weeks (45h main course and 90h self-study)
4. **Instructors:**

   1- Quyen Huy Anh, Ass. PhD
   2- Truong Viet Anh, Ass. PhD
   3- Nguyen Ngoc Au, MEng
   4- Le Trong Nghia, MEng
   5- Vu Thi Ngoc, MEng
   6- Nguyen Nhan Bon, PhD
5. **Course conditions**

   Prerequisites: Circuits, electric-electronic instruments; Electronic measurement and instrumentation; electrical safety.

   Corequisites: N/A.
6. **Course description**

   This course equips learner's contents of the method for determining the load calculation, calculate voltage loss, power loss, and short circuit calculations, select the number and transformer capacity, diagrams distribution substations and redundant power. Function and operating principle of the switchgear, medium and low voltage protection, the method selected conductors, cables, switchgear protect- sectioning measurement, distribution cabinet low and medium voltage, offset low voltage network power plant and industrial lighting calculations.
7. **Course Goals**

Goals	***Goal description*** *(This course provides students:)*	**ELOs**
G1	Basic knowledge of electrical power supply systems.	01 (H)
G2	An ability to use textbooks, books, power point slides and to do home works and exams in English.	07 (M)
G3	An ability to use tools and methods for solving problems related to electrical power supply systems.	02 (H)
G4	An ability to calculate and design electrical power supply systems and lighting systems.	05 (L)

** Note: High: H; Medium: M; Low: L*

8. Course Learning Outcomes (CLOs)

CLOs		***Description*** *(After completing this course, students can have:)*	**Outcome**
G1	G1.1	the ability to introduce power sources, the characteristics of electrical consumers.	01
	G1.2	the ability to introduce design requirements power supply.	01
G2	G2.1	the ability to introduce specifications in the plan of power supply.	02
	G2.2	the ability to introduce economic criteria in the plan of power supply.	02
	G2.3	the ability to find document, catalog, research themselves and present specialized contents.	07
G3	G3.1	the ability to analyze and solve many various calculation methods: loads; power transformer; active power loss; energy loss; short-circuit; power cables or wires; switchgear; medium or low voltage distribution cabinets; standby power sources, power quality by hand and MATLAB.	02
	G3.2	the ability to analyze and obtain knowledge of power supply diagrams; cables; medium or low voltage switchgear; medium or low voltage protection devices.	02
	G3.3	the ability to analyze the lightings and their application, calculate the lighting systems and use the DIALUX software.	02
	G3.4	the ability to design the electrical system (main single line).	02
	G3.5	the ability to design the lighting system.	02
	G3.6	the ability to select a reasonable solution to improve power factor.	07
G4	G4.1	the ability to present technical terms in English related power supply engineering fields.	05

9. Study materials

- Textbooks:

[1] Asc. Prof. Dr. Quyen Huy Anh, *Power Supply System Engineering* textbook, university level, technology branch, HCMUTE, 2006.

[2] Asc. Prof. Dr. Phan Thi Thanh Binh et al, *Electrical Installation Guide arcording to IEC Standars* textbook, Technical and Scientific Publisher, 2009.

[3] Asc. Prof. Dr. Quyen Huy Anh, *CAD in Electrical Engineering*, HCMC National University Publisher, 2008.

[4] Asc. Prof. Dr. Quyen Huy Anh, HCMUTE, *Notebook of Conformity Electrical Design,* HCMUTE, 2010.

[5] Asc. Prof. Dr. Quyen Huy Anh, *Electrical Safety Engineering*, HCMC National University Publisher, 2007.

- References:

[1] Nguyen Xuan Phu, Nguyen Cong Hien, Nguyen Boi Khue, *Power Supply System Engineering textbook*, Technical and Scientific Publisher, 2007.

[2] Ngo Hong Quang, Vu Van Tam, *Electrical power supply design*; Technical and Scientific Publisher, 2001.

[3] Pham Van Nien, *Design and Built of Material;* Technical and Scientific Publisher, 1996.

[4] Design of Electrical Services for Buildings, 4th Edition; Barrie Rigby; Spon Press 2005.

[5] Advanced Energy Design Guide for Small Retail Buildings; Merle McBride; American Society 2006.

[6] Analysis and Design of Low-Voltage Power Systems; Ismail Kasikci; Wiley 2004.

[7] Medium Voltage Design Guide; Merlin Gerin 2015.

[8] Electrical Distribution Engineering; Anthony J. Pansini; CRC 2007.

[9] Electric Power Distribution Equipment and Systems; T. A. Short; CRC 2006.

[10] Electrical Installation Caculations; A.J.Watkins; Newnes 2006.

[11] Electrical Installation Guide; Schneider Electric 2010.

[12] Electrical Installation Hanbook; ABB 2006.

[13] Lighting by Design 2Ed; Christopher Cuttle; BH 2008.

[14] Lighting Design Basics; Mark Karlen; Wiley 2004.

[15] Uninterruptible Power Supplies; McGrawHill 2004.

[16] Electric Power Substations Engineering; John D. McDonald; CRC 2006.

[17] Electrician's Exam Study Guide, B. D. Coffin, McGraw Hill 2007.

10. Student Assessments

- Grading points: 10
- Planning for students assessment is followed:

Assessment Types	Assessment Content	Time	Assessment techniques	CLOs	Rates (%)
Midterms					50
Exercise #1	Select appropriate economic-technicalmethods. Design simple power supply source to evaluate characteristics of electrical consumers.	Week 2	Questions /Exercises	G1.2, G2.1 G2.2	5
Exercise #2	Build data graphs from daily power load consumption. Use ECODIAL software to evaluate design.	Week 3	Questions /Exercises	G1.1, G3.1	5
Exercise #3	Determine the quantity of consumer graphs, calculation of electricity fees in a month hand or MATLAB.	Week 4	Questions /Exercises	G1.1, G3.1	5
Exercise #4	Determinepower capacity calculated by the Ku, Ks or method of load capacity per areas hand or MATLAB.	Week 5	Questions /Exercises	G1.1, G3.1	5

Exercise #5	Design a number and capacity of transformers in a power substation by hand or MATLAB.	Week 6	Questions /Exercises	G2.3, G3.1	5
Exercise #6	Determine a voltage loss, active power loss, power loss in the different types of electrical networks by hand and MATLAB.	Week 8	Questions /Exercises	G3.1	5
Exercise #7	Design and choosepower cable / wire / power circuit breaker by hand and MATLAB.	Week 10	Questions /Exercises	G3.1, G3.2 G3.4	5
Exercise #8	Calculate lighting systems/capacitor system by hand and DIALUX software.	Week 13	Questions /Exercises	G3.3, G3.6	5
Exercise #9	Students are required to read and learn a subject in groups. Student groups will report to the class or to submit essays depending on the requirements of the faculty. List of a following essays: 1. The Vietnam power system. 2. The criteria relating to power supply design. 3. Learn a network design softwares 4. Learn asoftware design lighting system. 5. Learn the wires / cables market in Vietnam. 6. Learn products of mediumvoltage protection. 8. Learn the types of lights in Vietnam market. 9. Learn capacitors and capacitor bank controllers. 10. Learn a electrical cabinets in Vietnam market. 11. The other power supply system topics.	Week 5- Week 15	Essay - Report	G2.3, G4.1	10
Final exam					50
	The final exam covers all expected learning outcomes of the subject: - The form of essay or multiple choice. - 60 minutes.		Multiple choice test/ Essay exam	G1.1, G1.2, G2.1, G2.2, G2.3, G3.1, G3.2, G3.3, G3.4, G3.5, G3.6, G4.1	

11. Course details:

Weeks	Contents	CLOs
1	***Chapter 1:*** **<PRINCIPLES OF POWER SUPPLY SYSTEMS>** *(3/0/6)*	
	A/ **Contents and teaching methods***: (3)* **Contents:** 1.1 Characteristic of industry factory power supply 1.2 Power source types 1.3 Principles of industry factory network 1.4 Characteristics of consumers 1.5 Requirement of power supply designs **Teaching methods:** + Oral Speaking + Discussion + Presentation	G1.1 G1.2
	B/ **Self- study contents**: *(6)* + Research trends and Development in power supply fields. + Vietnam power system.	G2.3
2	***Chapter 2:*** **<TECHNICAL – ECONOMIC CRITERIA OF A POWER SUPPLY PROJECT>** *(3/0/6)*	
	A/ **Contents and teaching methods***: (3)* **Contents:** 2.1 Principles. 2.2 A technical - economic calculation method. 2.3 Economic loss calculation for power supply interruption. 2.4 A Technical - economic calculationfor revised designs and substitution. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G2.1 G2.2
	B/ **Self- study contents**: *(6)* + Homework	G2.3
3	***Chapter 3:*** **<POWER LOAD CONSUMPTION>** *(3/0/6)*	
	A/ **Contents and teaching methods***: (3)* **Contents:** 3.1 Basics. 3.2 Power load graphs. 3.3 Quantities and calculation factors. 3.4 Methods of calculated power load determination. 3.5 Determination special power loads.	G3.1

	3.6 Choosing methods of calculated power load determination. 3.7 Procedure to power load calculations at voltage levels. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	
	***B/* Self- study contents**: *(6)* + Estimation power load consumption. + Homework.	G2.3
4	***Chapter 4:* <DIAGRAMS AND CHARACTERISTIC OF LOW VOLTAGE NETWORK>** *(3/0/6)*	
	A/* Contents and teaching methods: (3)* **Contents:** 4.1 Principles. 4.2 Low voltage systems. 4.3 Low voltage configurations. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G3.2
	***B/* Self- study contents**: *(6)* + Search and Study drawings.	G2.3
5	***Chapter 5:* <MEDIUM / LOW VOLTAGE SUBSTATION>** *(3/0/6)*	
	A/* Contents and teaching methods: (3)* **Contents:** 5.1 Basics. 5.2 Classification of low / medium voltage substations. 5.3 Choosing location, quantity and capacity low / medium voltage substations. 5.4 Types of low / medium voltage substation diagram. 5.5 Characteristic of low / medium voltage substation. 5.6 Measurement and testing low / medium voltage substation. 5.7 Operating low / medium voltage substation. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G2.3 G3.1 G3.2 G3.4 G4.1
	***B/* Self- study contents**: *(6)* + Search and study practical substation drawings. + Catalogues practical power transformers.	G2.3

6 7	***Chapter 6:*** **<POWER LOAD CALCULATING>** *(6/0/12)*	
	A/ **Contents and teaching methods***: (6)* **Contents:** 6.1 Basics. 6.2 Power losses in the grids. 6.3 Energy losses in the grids. 6.4 Voltage losses in the grids. 6.5 Examples. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G3.1
	B/ **Self- study contents**: *(12)* + Exercises.	G2.3
8	***Chapter 7:*** **<LOW VOLTAGE SHORT-CIRCUIT CALCULATION>** *(3/0/6)*	
	A/ **Contents and teaching methods***: (3)* **Contents:** 7.1 Basics. 7.2 Main short-circuit types. 7.3 Impedance calculation of elements. 7.4 Impedances methods for short-circuit calculation. 7.5 Determining components of short-circuit currents. 7.6 Examples. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G3.1
	B/ **Self- study contents**: *(6)* + Exercises.	G2.3
9 10	***Chapter 8:*** **<POWER SUPPLY DEVICES (MEDIUM / LOW VOLTAGES)>** *(6/0/12)*	
	A/ **Contents and teaching methods***: (6)* **Contents:** 8.1 The switchgear and medium voltage protection. 8.2 Selection of switchgear and medium voltage protection. 8.3 Characteristics of medium voltage distribution panel. 8.4 Characteristics of medium voltage distribution panel. 8.5 Selection and testing the conductors and low voltage cables.	G2.3 G3.1 G3.2 G3.4 G4.1

	8.6 Selection of power low voltage and protection devices.. 8.7 Selection and test measurement equipment antihypertensive. 8.8 Characteristics and selection of low voltage distribution panels. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	
	***B/* Self- study contents**: *(12)* + Exercises. + Search and study catalogues practical devices and panels.	G2.3
11 12	***Chapter 9:* <INDUSTRIAL LIGHTING SYSTEM>** *(6/0/12)*	
	A/* Contents and teaching methods: (6)* **Contents:** 9.1 Basics. 9.2 Quatities and Units for lighting mesuarement. 9.3 Standards and lighting requirements. 9.4 Methods of ligting calculation. **Teaching methods:** + Oral Speaking. + Discussion. + Presentation.	G2.3 G3.3 G3.5 G4.1
	***B/* Self- study contents**: *(12)* + Exercises. + Search and study catalogues practical lighting devices and panels.	G2.3
13	***Chapter 10:* <STANBY POWER SOURCES>** *(6/0/12)*	
	A/* Contents and teaching methods: (6)* **Contents:** 10.1 Basics. 10.2 Selection and characteristic of standby power supply. 10.3 Engine Generator. 10.4 Automatic Transfer Switch. 10.5 Uninterruptable Power Supply. **Teaching methods:** + Oral Speaking; Discussion. + Presentation.	G2.3 G3.1 G3.4 G4.1
	***B/* Self- study contents**: *(12)* + Exercises. + Search and study catalogues practical devices.	G2.3

14 15	***Chapter 11:*** **<POWER FACTOR IMPROVEMENT>** *(6/0/12)*	
	A/ **Contents and teaching methods***: (6)* **Contents:** 11.1 Basics. 11.2 Characteristic of power factor. 11.3 The benefits of improvement the power factor. 11.4 Methods improve the power factor. 11.5 Equipments improve the power factor. 11.6 Selection the equipments. 11.7 Identify capacitor placement. 11.8 Optimize the var compensator. **Teaching methods:** + Oral Speaking; Discussion. + Presentation.	G3.1 G3.4 G3.6 G4.1
	B/ **Self- study contents**: *(12)* + Exercises. + Search and study catalogues practical devices.	G2.3

12. Learning ethics:

Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero point.

13. First approved date: August 01 2012.

14. Approval level:

Dean **Department** **Instructor**

15. Syllabus updated process

1st time: Updated content dated	Instructors
2st time: Updated content dated	Head of department