SYLLABUS

1. **Course name:** Electrical Safety Engineering
2. **Course code:** ELSA320245
3. **Credits: 2** (2/0/4)

   Duration: 15 weeks (30h main course and 60h self-study)
4. **Instructors:**

   1- Quyen Huy Anh, Ass. PhD

   2- Nguyen Ngoc Au, MEng

   3- Le Cong Thanh, MEng

   4- Vu Thi Ngoc, MEng

   5- Nguyen Nhan Bon, PhD

   6- Vo Viet Cuong, PhD
5. **Course conditions**

   Prerequisites: Circuit Network Engineering, Electric-Electronic Measurement and Instrumentation;

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

This course provides the learner with knowledge of basic concepts of electrical safety, operating methods for electrical equipment and electrical networks are safety, measures to prevent dangerous electric shock, measures to avoid direct and spread lightning, grounding measures, help people when electrical accident.

7. **Course Goals**

Goals	***Goal description*** *(This course provides students:)*	**ELOs**
G1	Basic knowledge in the fields of electrical safety engineering.	01 (H)
G2	An ability to analyze and solve electrical and electronic matters related electrical safety engineering.	07 (H)
G3	An ability to use textbooks, books, PowerPoint slides and to do homework and exams in English.	05 (L)
G4	An ability to calculate and design: grounding system, lightning system, propose solutions for people and equipments.	02 (M)

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

8. **Course Learning Outcomes (CLOs)**

CLOs		***Description*** *(After completing this course, students can have:)*	**Outcome**
	G1.1	the ability to present basics of electrical safety	01
	G1.2	the ability to present safety solutions for people and equipment; for	01

		grounding system and against 6 point lightning	
	G1.3	the ability to present features safety tools, operational procedures and safety equipment repairs, emergency procedures to electrocute.	01
	G1.4	the ability to analyze is current through people for different grid types	01
	G1.5	the ability to classify standard grounding systems, advantages and disadvantages and application scope of each type of system.	01
	G1.6	the ability to present features of the protective device and application scope of each type	01
	G2.1	the ability to explain of the types of accidents and propose solutions to protect people against direct shock, anti-shock indirectly, against the harmful effects of electromagnetic fields and electrostatic	01, 07
	G2.2	the ability to analyze and propose solutions to protect the device against over current, voltage noise, electromagnetic interference, to prevent the intrusion of solid objects and water	01, 07
	G2.3	the ability to assess the risk of damage caused by lightning and the lightning prevention measures	07
	G2.4	the ability to assess the state power by accident victims, the proposed procedures and emergency treatment of victims.	07
	G2.5	Be able to search for documents, research and presentation of content relating to electrical safety	07
G3	G3.1	the ability to present the English terminology used in the field of electrical safety.	05
	G4.1	the ability to design a grounding system	02
	G4.2	the ability to design a lightning protection system	02
	G4.3	the ability to choose a solution to ensure safety for people and equipment.	02, 07

9. Study materials

- Textbooks:

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

- References:

[2] Nguyen Xuan Phu, Nguyen Cong Hien, Nguyen Boi Khue, Ky thuat an toan trong cung cap va sudung dien, Technical and Scientific Publisher, 1989.

[2] *Indoor Electrical Safety Check*, Electrical Safety Foundation International, 2004.

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

[4] *Outdoor Electrical Safety Check*, Electrical Safety Foundation International, 2004.

[5] *Low voltage electrical work*, Code Of Practical Work cover, New South Wales, 2007.

[6] PhanThiThuVan, *Electrical Safety*, HCMC National University Publisher, 2002.

[7] *Qui trinh ky thuat an toan dien trong cong tac quan ly, van hanh, sua chua, xay dung duong day, tram dien*, EVN, Ha Noi 1999.

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	Distinguish step voltage and contact voltage. Mentioned resistance value calculated, the value of voltage and current allows.	Week 10	Questions /Exercises	G1.1	5
Exercise #2	Mentioned factors affect the resistivity of the earth and the earth resistance value required in the various cases. Explanation of symbols TT, TNC, TNS, IT	Week 10	Questions /Exercises	G1.5	5
Exercise #3	Outlined measures against direct shock.	Week 10	Questions /Exercises	G1.1 G1.3 G1.4 G2.1	5
Exercise #4	Anti-shock measures referred indirectly to the network TT / or TNC / or TNS / or IT.	Week 10	Questions /Exercises	G1.1 G2.1	5
Exercise #5	Stating the safety measures to protect against overcurrent device, voltage noise, electromagnetic interference and electrostatic	Week 15	Questions /Exercises	G1.2 G2.1 G2.2	5
Exercise #6	Measures presented direct lightning	Week 15	Questions /Exercises	G1.2 G2.3 G4.2	5
Exercise #7	Presentation of Surge Protection measures on resource roads / or signal lines	Week 15	Questions /Exercises	G1.2 G2.3 G4.2	5
Exercise #8	Tool lists the safety and rescue flowchart	Week 15	Questions /Exercises	G1.3 G2.4 G4.3	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 the following essays: 1. Calculate and grounding system design	Week 5-Week 15	Essay - Report	G2.5 G3.1	10

	2. Calculate and design of lightning protection systems directly 3. Calculate and design Surge Protection System on the way resources 4. Calculate and design of lightning protection systems spread over the signal line 5. Propose measures against direct shock 6. Propose measures against indirect shock in each different type of phone network. 7. Process safety management power in the company or enterprise 8. The process of inspection and safety checks in companies and enterprises 9. The method of artificial respiration hill with various objects 10. The other thematic				
Final exam					50
	- The content covers all the important outcomes of the course. - The form of essay or multiple choice - Time to do all 60 minutes		Multiple choice test	G1.1 G1.2 G1.3 G1.4 G1.5 G1.6 G2.1 G2.2 G2.3 G2.4 G2.5 G3.1 G4.1 G4.2 G4.3	

11. Course details:

Week	Contents	CLOs
	CHAPTER 1. PRINCIPLES OF ELECTRICAL SAFETY ENGINEERING (4/0/8)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 1.1 Rationale	

	1.2 Electrical Accident 1.3 Effect of electric current on the human body 1.4 Factors affecting electrocution accident 1.5 Current dissipation in soil **Teaching methods:** + Oral Speaking + Discussion + Presentation	
	B. Study at home (4) + The types of exposure to electrical network + The value of voltage and current safely to the	
	Chapter 1: PRINCIPLES OF ELECTRICAL SAFETY ENGINEERING (cont)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 1.6 Voltage step 1.7 Voltage exposure 1.8 Classification of buildings and electric equipment 1.9 The main reason causing the electrical accidents **Teaching methods:** + Oral Speaking + Discussion + Presentation	G1.1 G2.5
	B. Study at home (4) 2.1 Homework	
	Chapter 2: ANALYZING THE CURRENT THROUGH PEOPLE (2/0/4)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 2.1 Electric Network insulated the ground 2.2 Grounding System 2.3 The protection methods **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	G1.2 G1.4 G2.5
	B. Study at home (4)	

	+ Exercise	
	Chapter 3: GROUNDING SYSTEM (4/0/8)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 3.1 Introduction 3.2 The standard grounding systems 3.3 Soil Resistivity 3.4 Grounding types **Teaching methods:** + Oral Speaking + Discussion + Presentation	G1.5 G2.5 G3.1 G4.1
	B. Study at home (4) Homework	
	Chapter 3: GROUNDING SYSTEM (cont)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 3.5 The grounding methods 3.6 Ground resistance 3.7 Analysis of modern grounding system **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	G1.5 G2.5 G3.1 G4.1
	B. Study at home (4) Guide the GEM software	
	Chapter 4: LOW VOLTAGE SWITCHES AND PROTECTION DEVICES (4/0/8)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 4.1 Introduction 4.2 Circuit breaker **Teaching methods:** + Oral Speaking + Discussion + Presentation	G1.3 G1.6 G2.2 G2.5 G3.1 G4.3
	B. Study at home (4)	

	Study low voltage Circuit breaker Documents	
	Chapter 4: LOW VOLTAGE SWITCHES AND PROTECTION DEVICES (cont)	
	A. Contents and teaching methods in the classroom (2)	G1.3
	Contents:	G1.6
	4.3Earth leaking devices	G2.2
	4.4Fuses	G2.5
	Teaching methods:	G3.1
	+ Oral Speaking	G4.3
	+ Discussion	
	+ Presentation	
	B. Study at home (4) Study low voltage earth leaking devices documents	
	Chapter 5: SAFETY FOR PEOPLE (6/0/12)	
	A. Contents and teaching methods in the classroom (2)	G1.2
	Contents:	G2.1
	5.1 Protection against direct contact	G2.5
	5.2 Protection against indirect contact	G4.3
	5.3 Protection against direct contact and indirect	
	5.4 Protection against shock from contact with electrical carriers	
	Teaching methods:	
	+ Oral Speaking	
	+ Discussion	
	+ Presentation	
	B. Study At Home (4) Homework	
	Chapter 5: SAFETY FOR PEOPLE (cont)	
	A. Contents and teaching methods in the classroom (2)	G1.2
	Contents:	G2.1
	5.3 Protection against direct contact and indirectcontact	G2.5
	5.4 Protection against electrical shock due to contact with electrical devices	G4.3
	Teaching methods:	
	+ Oral Speaking	
	+ Discussion	
	+ Presentation	
	B. Study At Home (4) Solutions for protection against direct contact and indirect contact	
	Chapter 5: SAFETY FOR PEOPLE (cont)	

	A. Contents and teaching methods in the classroom (2) **Contents:** 5.5 Protection against burning arc 5.6 Protection against the harmful effects of electromagnetic fields 5.7 Protection against the harmful effects of electrostatic **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	G1.2 G2.1 G2.5 G4.3
	B. Study At Home (4) Homework	
	CHAPTER 6: SAFETY FOR ELECTRICAL DEVICES (2/0/4)	
	A. Contents and teaching methods in the classroom (2) **Contents:** 6.1 Protection against thermal effects 6.2 Protection against overcurrent 6.3 Protection against voltage disturbances and electromagnetic interference 6.4 Protection against intrusion of solid objects and water **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	G1.2 G2.2 G2.5 G3.1
	B. Study At Home (4) Homework	
	Chapter 7: LIGHTNING PROTECTION (6/0/12)	
12	**A. Contents and teaching methods in the classroom (2)** **Contents:** 7.1 Introduction 7.2 Overview of lightning 7.3 Classification of works to be protected 7.4 Comprehensive Lightning Protection Solutions 7.5 Technique against lightning at a predetermined point 7.6 Lead lightningto groungding system **Teaching methods:**	G1.2 G2.3 G2.5 G4.2

	+ Oral Speaking + Discussion + Presentation + Sample Exercise	
	B. Study At Home (4) Overview of lightning in Vietnam	
	Chapter 7: LIGHTNING PROTECTION (cont)	
13	**A. Contents and teaching methods in the classroom (2)** **Contents:** 7.7 Leading lightning energy to the earth system 7.8 Equipotentiality earthing systems 7.9 Surge Protection Technique on power sources **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	 G1.2 G2.3 G2.5 G4.2
	B. Study At Home (4) Study Documents of Surge Protection Technique on power sources	
	Chapter 7: LIGHTNING PROTECTION (cont)	
14	**A. Contents and teaching methods in the classroom (2)** **Contents:** 7.10 Surge Protection Technique on the signal lines 7.11 Examples **Teaching methods:** + Oral Speaking + Discussion + Presentation + Sample Exercise	G1.2 G2.3 G2.5 G4.2
	B. Study At Home (4) Study Documents of Surge Protection Technique on the signal lines	
	Chapter 8: TOOLS AND MANAGEMENT ELECTRICAL SAFETY **Chapter 9: RESCUE PEOPLE THAT ELECTRICAL SHOCK (2/0/4)**	
15	**A. Contents and teaching methods in the classroom (2)** **Contents:** 8.1 Technical Solutions for electrical safety 8.2 Decentralisation and organization for safety	G1.3 G2.4 G2.5 G4.3

	8.3 Technical Inspectorate electrical safety 9.1 Introduction 9.2 Flowchart rescue **Teaching methods:** + Oral Speaking + Discussion + Presentation	
	B. Study At Home (4) Study decentralisation and organization for safety Study technical investigation content for electrical safety	

12. Learning ethics:

- The homework, tests and exam must be done by the students themselves. If detect copying, use document is not allowed, the students involved must be evaluated 0 (zero) at process exam and final exam.

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