ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
Faculty of Electrical and Computer Engineering
COURSE SYLLABUS
Electrical Networks Laboratory

1. CODE AND NUMBER OF CREDITS

CODE	FIEC01800	
NUMBER OF CREDITS: 3	**Theoretical:** 0	**Practical:** 3

2. COURSE DESCRIPTION

Complement the theoretical knowledge acquired in Analysis of Electrical Networks with a group of experiments about the basic laws of electricity, using for this different instruments of measuring, both real and virtual. The course also uses electrical networking simulation tools as a part of the practices.

3. PRE-REQUISITES AND CO-REQUISITES

PRE-REQUISITES	FIEC01735 ANALYSIS OF ELECTRICAL NETWORKS I
CO-REQUISITES	

4. CORE TEXT AND OTHER REQUIRED REFERENCES FOR THE TEACHING OF THE COURSE

CORE TEXT	1. Luis Fernando Vàsquez Vera, Guía de laboratorio de Redes Eléctricas, first edition,2013,Centro de Difusión y Publicación-ESPOL.
REFERENCES	1. FLUKE 111 MANUAL 2. METERMAN FUNCTION GENERATOR MANUAL 3. TEKTRONIK OSCILOSCOPE MANUAL. 4. VOLTIMETER MANUAL 5. MULTISIM MANUAL 6. ANALISIS DE CIRCUITOS EN INGENIERÍA HAY KEMMERLY.- sexta edición. 7. CIRCUITOS DE CONTINUA.- Editorial Paraninfo. 8. CIRCUITOS DE CORRIENTE ALTERNA.- Editorial Paraninfo. 9. MANUALES DE LABVIEW.- National Instruments.

5. COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to:

1. Know the basics of electricity, the different conditions and environment for working safely and a quick and right answer during emergencies.
2. Do measures of current , voltage and potency in an electrical network
3. Know and to apply the different measuring devices in the laboratory.
4. Familiarize with the libraries of the software MULTISIM.
5. Know then environment and the reach of the software Labview in the technological world.
6. Familiarize with the virtual tools of Labview.
7. Build any type of basic electrical circuit with the help of a circuit diagram.
8. Measure the total potency output of a triphasic network using different methods.
9. Understand the technical specifications of any measuring device using the respective manuals.
10. Prove the relations of Voltage, Current and Potency in a real Transformer.

6. COURSE PROGRAM

I. Practice #1
- Industrial Security talk.
- Workplace- Virtual and physical instruments.
- Introduction to Multisim

II. Practice #2
- Intro to Labview 1 and common functions.
- Understand the components of a virtual instrument

III. Practice #3
- New functions of Labview.
- Data acquisition

IV. Practice #4
- Voltage and current measuring.
- Application of Thevening's theorem.

- Use of the workstation NI ELVIS.

V. Practice #5
- Learn the functioning, handle and realization of the measuring of voltage, period, frequency with the oscilloscope.
- Lissajous curves analysis.

VI. Practice #6
- Measuring of the phase difference using double tracing methods and XY using the virtual and real oscilloscope.
- Measuring of current and voltage with a real and virtual oscilloscope.

VII. Practice #7
- Measuring of the time constant for RL and RC circuits, using virtual and real instrumentation.

VIII. Practice #8
- Determination of the M.L, Rint and K parameters for coupled turbines.
- Determination of relative polarity between two turbines.
- Determination of the relative polarity in a transformer.

IX. Practice #9
- Prove the relation between voltage, current and potency in a real transformer.
- Learn the use and differences of: Real, Virtual and Digital Wattmeter.
- Measure and obtain the graphics ofvoltage, current and potency with a program based on the basic tools of Labview.
- Know the handle of the Signal conditioner NI-SCXI.

X. Practice #10
- Measuring of current, voltages in a triphasic system.
- Measuring of the potency in a triphasic system using two wattmeters.
- Find experimentally the potency factor of a triphasic system
- Measuring of the potency in a triphasic system using three wattmeters.
- Potency factor improvement on triphasic networks.

7. WORKLOAD: THEORY/PRACTICE

Each one of the practices is 3 hour long.

8. CONTRIBUTION OF THE COURSE TO THE EDUCATION OF THE STUDENT

Learn how to use the different measuring instruments, both real and virtual. Also the computational programs , actualized, for the simulation of circuits, like Labview and Multisim and the acquisition of data.

BASIC TRAINING	PROFESSIONAL TRAINING	SOCIAL SKILLS DEVELOPMENT
	X	

9. THE RELATIONSHIP BETWEEN THE LEARNING OUTCOMES OF THE COURSE AND THE LEARNING OUTCOMES OF THE DEGREE PROGRAM

LEARNING OUTCOMES OF THE DEGREE PROGRAM*	CONTRIBUTION (High, Medium, Low)	LEARNING OUTCOMES OF THE COURSE**	THE STUDENT MUST:
a) An ability to apply knowledge of mathematics, science and engineering.	Medium	1	Apply the concepts of Physics and Analysis of Electrical Networks I for electrical circuit analysis.
b) An ability to design and conduct experiments, and to analyze and interpret data	High	2	Do experiments to complement the basic knowledge of electricity.
c) An ability to design a system, component or process to satisfy realistic constraints.	Medium	5	Practices are realized using the basic knowledge of electricity.
d) An ability to function on multidisciplinary teams.	Medium	7	Practices are realized in groups of 2 persons.
e) An ability to identify, formulate and solve engineering problems.	---		

f)	An understanding of ethical and professional responsibility.	Medium	1	Values are always highlighted at the time of doing a procedure.
g)	An ability to communicate effectively.	Medium	1	Demonstrates the ability to present the laboratory reports and oral presentations.
h)	A broad education necessary to understand the impact of engineering solutions in a social, environmental, economic and global context.	---		
i)	A recognition of the need for, and an ability to engage in life-long learning.	---		
j)	A knowledge of contemporary issues.	---		
k)	An ability to use the techniques, skills, and modern tools necessary for engineering practice.	High	4	Present the simulation for each of the different circuits before the practive.
l)	Capacity to lead, manage and undertake projects.	---		

10. EVALUATION IN THE COURSE

Evaluation activities	
Exams	X
Tests	X
Homework/tasks	X
Projects	
Laboratory/Experiments	
Class participation	
Visits	
Other	X

11. PERSON RESPONSIBLE FOR THE CREATION OF THE SYLLABUS AND THE DATE OF ITS CREATION

Created by	Ing. Luis Fernando Vásquez Vera
Date	26 FEB 2013

12. APPROVAL

ACADEMIC SECRETARY OF THE ACADEMIC DEPARTMENT	DIRECTOR OF TECHNICAL ACADEMIC SECRETARY
NAME: Mrs. Leonor Caicedo G.	NAME: Eng. Marcos Mendoza
SIGNATURE:	SIGNATURE: ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL Ing. Marcos Mendoza V. DIRECTOR DE LA SECRETARÍA TÉCNICA ACADÉMICA
Date of approval by the Directive Council: 2013-537 2013-10-7	

13. VALIDITY OF THE SYLLABUS

RESOLUTION OF THE POLYTECHNIC BOARD:	13-12-343
DATE:	2013-12-12