ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
Faculty of Electrical and Computer Engineering
COURSE SYLLABUS
Electronics I

1. CODE AND NUMBER OF CREDITS

CODE	FIEC00075	
NUMBER OF CREDITS: 4	Theoretical: 4	Practical: 0

2. COURSE DESCRIPTION

The Electronics I course presents the study of the different characteristics of the two terminal devices, of the BJT transistors and of the FETS transistors for the analysis of various circuits, using the tools learned in Electrical Circuit Analysis I.
We also analyze and design different non-regulated regulative voltage circuits using capacitive filters and regulated ones using Zener diodes and BJT transistors.
We also analyze and study the behavior in function of time of the Voltage and Current variables present in a circuit.
Finally the course presents the Multi-step amplification devices using the different transistors mentioned with the purpose of calculating the operation points and the different amplification parameters.

3. PRE-REQUISITES AND CO-REQUISITES

PRE-REQUISITES	FIEC01735 Electrical Network Analysis I
CO-REQUISITES	

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

CORE TEXT	M.Yapur, F.Vásquez, S.Ríos, E.Herrera, D. Plaza. Electrónica I-Teoría y Solucionario de Problemas. 1ra Edicion. 2006. Centro de Difusión ESPOL
REFERENCES	1. A. S. Sedra y K. C. Smith. Circuitos Microelectrónicos. McGraw-Hill, 5ta edición. 2006. 2. R. Boylestad, L. Nashelsky. Electrónica: Teoría de Circuitos y Dispositivos Electrónicos. Pearson, 10ma edición. 2009.

5. COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to:
1. Know the electrical and physical characteristics of the semi conductive devices.
2. Analyze basic electronic circuits where these devices are used.
3. Design basic electronic circuits.

6. COURSE PROGRAM

I. Two terminal Devices (4 sessions-8 hours)
- Introduction to semiconductors.
- P-N junction: Characteristics and polarization
- Ideal Diode
- Clippers and Clampers
- Real Diode: Curves and characteristics
- Equivalent circuits on AC and DC
- Operation points and load lines
- Zener diode: Ideal and real
- Basic transfer functions

II. Rectifiers and Capacitive filters (3 sessions - 6 hours).
- Half-wave single phase rectifiers
- Full-wave single phase rectifiers
- Capacitive filters and non-regulated DC sources

III. Other two terminal devices (2 sessions – 4 hours).
- Led Diode
- Tunnel Diode
- Schoktty Diode

- Varicap Diode
- Optical Diodes (photodiodes.)
- Thermistors

IV. Transistors (3 sessions - 6 hours).
- The transistor effect
- Bipolar transistor (BJT): Types and regions of work
- Common base configurations, common emitter and common collector
- Characteristic curves. BJT transistor specifications.
- Field effect transistors (FET):Types and basic configurations

V. Polarizing Bipolar Transistors (4 sessions - 8 hours).
- Alpha and Beta parameters of BJT transistors
- Operation points and load lines
- Fixed, H-type and retro alimentation polarization
- Stability BJT transistors
- The transistor as a switch: applications with relays

VI. Voltage regulators with BJT transistors (2 sessions - 4 hours).
- Serial regulators
- Parallel regulators
- Adjustable regulators

VII. Low signal amplifications with BJT (3 sessions - 6 hours).
- Two-port networks theory and hybrid parameters
- Pi and T equivalent circuits , including outpout resistance (ro)
- Common collector, base and emitter circuits
- Voltage and current gains (Av) (Ai)
- Input and output impedances (Zi) (Zo)

VIII. Other semiconductor dispositives of 3 and 4 terminals (4 sessions - 8 hours).
- Functioning principle: concepts and types of Thyristors
- Analysis and operation curves
- Relaxation Oscillators
- Basic applications and AC synchronism

IX. Operational Amplifiers (OPAMP) and applications (3 sessions - 6 hours).
- Ideal in-out characteristics of OPAMP
- Basic configurations
- Inverter amplifier
- Non-inverter amplifier
- Adding amplifier
- Differential amplifier

7. WORKLOAD: THEORY/PRACTICE

2 sessions weekly of 2 hours each

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

The course of Electronics I is oriented to design in Engineering.

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.	High	1	Apply the concepts of equation systems and component modeling.

b)	An ability to design and conduct experiments, and to analyze and interpret data	---	0	
c)	An ability to design a system, component or process to satisfy realistic constraints.	Low	3	
d)	An ability to function on multidisciplinary teams.	---	0	
e)	An ability to identify, formulate and solve engineering problems.	High	2	Basing himself on the configuration of the presented circuit, the student will be able to identify what would be the most adequate configuration, to later proceed to solve the problem.
f)	An understanding of ethical and professional responsibility.	---	0	
g)	An ability to communicate effectively.	---	0	
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.	---	0	
j)	A knowledge of contemporary issues.	Low	3	
k)	An ability to use the techniques, skills, and modern tools necessary for engineering practice.	Medium	2	Handle simulators and analyze results.
l)	Capacity to lead, manage and undertake projects.	---	0	

10. EVALUATION IN THE COURSE

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

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

Created by	Eng. Luis Fernando Vásquez Vera
Date	08 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
Date of approval by the Directive Council: 2013-537 2013-10-7	Ing. Marcos Mendoza V. DIRECTOR DE LA SECRETARIA TÉCNICA ACADEMICA

13. VALIDITY OF THE SYLLABUS

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