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

1. CODE AND NUMBER OF CREDITS

CODE	FIEC01347	
NUMBER OF CREDITS: 3	**Theoretical: 0**	**Practical: 3**

2. COURSE DESCRIPTION

The Electronics Laboratory B is a practical matter located at the end of the mesh of the career in which tests and simulations are performed with analog circuits linear and nonlinear, integrating knowledge from other areas of modern electronics. In the course students develop a project that covers the design process from specification approach, through testing and redesign to reach manufacturing a printed circuit board and final assembly of the equipment. In projects and practices of matter are studied circuits such as: Amplifiers, filters, timers, VCO, PLL, oscillators, converters, Comparators, and other sources, which are the basis of the equipment used in industry, commerce and households.

3. PRE-REQUISITES AND CO-REQUISITES

PRE-REQUISITES	FIEC01099 ELECTRONICS LABORATORY A
CO-REQUISITES	FIEC01388 ELECTRONICS III

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

CORE TEXT	1. Ríos, Sara; "Prácticas de Electrónica"; Tercera edición, 2013, CDP-ESPOL, Ecuador.
REFERENCES	1. Jacob, J. M.; "Application and Design with Integrated Circuits", 1995, Reston Publishing Co., Reston, Va. 2. Savant, C. J., Matin Roden y Gordon Carpenter; "Diseño Electrónico", Segunda edición, 1992, Addison-Wesley Iberoaméricana, Wilmington, Delaware. 3. Coughlin, Robert y Driscoll, Frederick; "Amplificadores operacionales y circuitos integrados lineales", Quinta edición, 1999, Prentice Hall, México. 4. Boylestad, Robert y Nashelsky, Louis; "Electrónica, Teoría de Circuitos", Sexta edición, 2002, Prentice Hall, México, 5. "Ecg Semiconductors – Master Replacement Guide", 1998, Phillips Semiconductors.

5. COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to:
1. To implement and enhance the theoretical knowledge acquired in Electronics II and Electronics III courses.
2. To develop an electronic circuit as a course project, which will include the following items: simulation, protoboard testing, PCB construction and a final presentation including a technical report?
3. To simulate analog electronic circuits to verify the theory and validate the experimental results found in the laboratory sessions.
4. Using data acquisition technology to the computer to have multiple methods of measurement and control, which allows you to practice with new tools and equipment.

6. COURSE PROGRAM

I. LAB No. 1: Biasing and small signal amplification with Field Effect Transistors (FET's) (1 sessions - 3 hours).
- JFET and MOSFET self-bias and amplification.
- MOSFET Polarization by voltage divider and Amplification.

II. LAB No. 2: Frequency response for transistor amplifiers (1 sessions - 3 hours).
- Low frequency response in amplifiers with FET.
- High frequency response in multistage amplifiers with FET.

III. LAB No. 3: Power amplifiers (1 sessions - 3 hours).
- Analysis of a Class A amplifier.
- Analysis of a Class B amplifier.

IV. LAB No. 4: Instrumentation Applications of OPAMP (1 sessions - 3 hours).
- Differentiator.

- Integrator.
- Instrumentation amplifier.

V. LAB No. 5: Operational Amplifier Applications in control circuits (1 sessions - 3 hours).
- Hysteresis loop.
- Control circuit on/off.
- AC Voltage control circuit.

VI. LAB No. 6: Active filters (1 sessions - 3 hours).
- Low-pass active filter: Butterworth.
- Band-pass active filter.
- Notch filter.

VII. LAB No. 7: Regulated power supplies: linear and switching mode (1 sessions - 3 hours).
- Source with series regulation and current limiting.
- Variable power supply with integrated regulator.
- Regulated switching mode power supply.

VIII. LAB No. 8: Oscillators (1 sessions - 3 hours).
- Square wave generator.
- Triangular wave generator.
- Sine wave generator.

IX. LAB No. 9: Timers (1 sessions - 3 hours).
- Astable operation.
- Duty cycle.
- Monostable operation.

X. LAB No. 10: Precision function generator with XR2206 (1 sessions - 3 hours).
- Function generator: sine, triangular and square waves.
- Amplitude modulation (AM).
- Frequency shift keying modulation (FSK).

XI. LAB No. 11: Applications of phase-locked loop (PLL) and Voltage Controlled Oscillator (VCO) (1 sessions - 3 hours).
- Sawtooth wave generator.
- PLL for modulation and demodulation.

XII. LAB No. 12: Nonlinear amplifiers (1 sessions - 3 hours).
- Absolute value.
- Peak detector.
- Multiplier application.

XIII. Project Final Presentation (2 sessions - 6 hours).

7. WORKLOAD: THEORY/PRACTICE

1 Session weekly of 3 hours.

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

The Electronics Laboratory B course is oriented to engineering design.

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	Analyze and design circuits, and obtain equations that support its operation, which are included in the weekly report and the final project report.
b) An ability to design and conduct experiments, and to analyze and interpret data	Medium	3	Submit a weekly report of the experiments performed at every practice.
c) An ability to design a system, component or process to satisfy realistic constraints.	High	2	Design, simulate, and implement a linear and / or nonlinear analog electronics project, which shall submit a final report.

d)	An ability to function on multidisciplinary teams.	High	2	To work in groups of 2 students in the practices and projects assigned.
e)	An ability to identify, formulate and solve engineering problems.	Medium	1	Identify and articulate in the projects the problems encountered and their solutions, which should be evident in the final report.
f)	An understanding of ethical and professional responsibility.	Medium	2	Present project progress properly prepared, which are qualified in deadlines.
g)	An ability to communicate effectively.	High	2	Submit a report each practice and a final report on the design and development of your project, which is supported against the teacher.
h)	A broad education necessary to understand the impact of engineering solutions in a social, environmental, economic and global context.	Low		
i)	A recognition of the need for, and an ability to engage in life-long learning.	Medium	4	Researching websites of manufacturers of integrated circuits, the chip features to be used. The above web pages should be named in the literature of the final report.
j)	A knowledge of contemporary issues.	Medium	4	Apply knowledge in designs that solve current social problems.
k)	An ability to use the techniques, skills, and modern tools necessary for engineering practice.	Medium	3	Practicing with laboratory instruments and modern simulators, to corroborate the theoretical concepts, which will be evident to the weekly report.
l)	Capacity to lead, manage and undertake projects.	Low		

10. EVALUATION IN THE COURSE

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

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

Created by	Eng. Sara Ríos
Date	5 – May – 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 SECRETARIA 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