DEGREE CURRICULUM

ANALOGUE ELECTRONICS

Coordination: GARRIGA CASTILLO, JUAN ANTONIO

Academic year 2016-17

ANALOGUE ELECTRONICS 2016-17

Subject's general information

Subject name	ANALOGUE ELECTRONICS
Code	102123
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	<table><tr><th>Degree</th><th>Course</th><th>Typology</th><th>Modality</th></tr><tr><td>Bachelor's Degree in Automation and Industrial Electronic Engineering</td><td>3</td><td>COMPULSORY</td><td>Attendance-based</td></tr></table>
ECTS credits	6
Groups	1GG,2GM,4GP
Theoretical credits	3
Practical credits	3
Coordination	GARRIGA CASTILLO, JUAN ANTONIO
Department	INFORMATICA I ENGINYERIA INDUSTRIAL
Teaching load distribution between lectures and independent student work	60h of class 90h of autonomous work 1 ECTS = 10h of class + 15 h of autonomous work
Important information on data processing	Consult this link for more information.
Language	Català 20.0 Castellà 80.0
Office and hour of attention	Friday: 11:00 - 13:00 h / Despatx 2.18 entrada pel 2.19 Thursday 17:00- 19:00 h / Despatx 2.18 entrada pel 2.19

ANALOGUE ELECTRONICS 2016-17

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GARRIGA CASTILLO, JUAN ANTONIO	garriga@diei.udl.cat	6,8	Tuesday from 17:00 to 19:00 Thursday from 15:00 to 17:00
URRECHO TORRES, JOSÉ MIGUEL	jurrecho@diei.udl.cat	3	

Subject's extra information

As previously described analogue electronics relies heavily on the knowledge and skills acquired in the subjects of Circuit Theory and Electronic Engineering Fundamentals making it very important that the students have taken the courses and studied the subjecta earlier. Without this knowledge base the course will provide a high level of difficulty to the student that takes it for the first time. It is also considered very convenient to have computer skills to manage electronic simulation programs around a personal computer.

Analogue Electronics is a 6-credit course, mandatory, which is taught in the first semester of the third year of the Degree in Industrial Engineering and Automation. This course complements the subject of Fundamentals of Electronic Engineering, we study the electronics part which is associated to the analog signal processing and therefore most of the circuits built around the operational amplifier and other integrated circuits.

Thus requires knowledge and skills acquired in the course Fundamentals of Electronic Engineering and other acquired skills, specifically in the subject Circuit Theory.

Learning objectives

- Provide students with the necessary knowledge to develop operating analog electronic systems.
- To study the main functional elements of analog electronics.
- Apply techniques that allow the use of reliable and economical.
- Establish the knowledge of discrete electronic devices, and their use in circuit design.
- Designing electronic circuits that meet certain specifications.
- Compare the knowledge acquired in theory with the results obtained in the laboratory.

Competences

Cross - disciplinary competences

- **EPS1**. Capacity to solve problems and prepare and defence arguments inside the area of studies.
- **EPS6**. Capacity of analysis and synthesis

Specific competences

- **GEEIA20.** Knowledge of the basics and applications of the analogue electronics.
- **GEEIA21.** Knowledge of the basics and applications of the digital electronics and microprocessors.
- **GEEIA22.** Applied knowledge of power electronics.
- **GEEIA23.** Applied knowledge of electronic instrumentation
- **GEEIA24.** Capacity to design analogue, digital and power electronic systems.

Subject contents

1. Differential and multistage integrated amplifiers.
   1.1. Polarization of integrated circuits with bipolar transistors
   1.2. Polarization integrated circuits FET
   1.3. differential amplifier

2. Operational Amplifiers.
   2.1. The ideal operational amplifier
   2.2. Linear circuits with operational amplifier.
   2.3. nonlinear circuits with Operational Amplifier.
   2.4. Non-ideal properties of operational amplifiers.

3. Frequency response.
   3.1. Bode plots
   3.2. The Miller effect
   3.3. High frequency amplifiers
   3.4. Low-frequency response.

4. Feedback and oscillators.
   4.1. Feedback effects on profit
   4.2. practical feedback networks
   4.3. Design of amplifiers with feedback
   4.4. Frequency response.
   4.5. Principles oscillator

5. Active filters and tuned circuits.
   5.1. Types of active filters
   5.2. Series and parallel resonant circuits
   5.3. Impedance matching networks.
   5.4. tuned amplifiers

6. Formers wave circuits and data converters.
   6.1. comparators and Schmitt trigger circuit
   6.2. astable multivibrators
   6.3. The timer 555
   6.4. Converters A/D and D/A

Methodology

Classroom activities are divided into three parts: lectures, problem solving and practices.

- **Lectures:** In the lectures the contents of the subject are presented orally by a lecturer without the active participation of students.
- **Troubleshooting**: In the problem-solving activity, the teacher presents a complex issue that students must solve, either working individually or in teams.
- **Practices**: Let you apply and configure a practical level, the theory of a field of knowledge in a particular context. Before entering the lab, the student must have previously analyzed and simulated circuit to ride and show a pre-report.

The kinds of problems and practices will be taught in small groups of students. Having smaller groups of students, promotes dialogue and participation thereof.

The non-contact activities are divided into two parts: strengthen their knowledge autonomously based on the teaching material provided or recommended by the teacher, and reporting on the development of practices.

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Development plan

Week	Methodology	Temary	Contact hours	Independent work hours
1-2	Master class problems	Tema1	8 h	12 h
3	Master class Simulation	Tema 1	4 h	6 h
4-5	Master class Practices	Tema 2	8 h	12 h
6-7	Master class problems	Tema 2	8 h	12 h
8	Master class Simulation	Tema 2	4 h	6 h
9	Written test Delivery practices	Tema 1 a Tema 2 Practices	2 h	
10-11	Master class Practices	Tema 3	8 h	12 h
12	Master class problems	Tema 4	4 h	6 h
13	Master class Simulation	Tema 5	4 h	6 h
14-15	Master class Practices	Tema 6	8 h	12 h
16	Written test Delivery practices	Tema 3 a Tema 6 Practices	2 h	

During the first weeks of the course theory classes and problems develop first topic, and then (about the 3rd week) practice sessions were initiated in the laboratory for the issue developed.

This development plan will be conducted throughout the course, so, in the laboratory practices will be performed once acquired knowledge to carry them out.

The corresponding practical reports will be delivered as the same day deadline set for the completion of the partial examination, must contain the theoretical results, simulated and those obtained in the laboratory, practices made to date.

Evaluation

To pass the course requires passing practices.
Theory (Examinations) 70%, the minimum score on each test to make half will be 4 out of 10. Minimum mark of theory to pass the course in May.

Practices (Assistance + Reporting) 20%, reports should contain the relevant practice analysis, simulation and the empirical data.

Non-contact work (collection of solved problems) 10%

INSTRUCTIONS FOR THE CORRECT DEVELOPMENT REVIEW

Present the DNI / Passport in the test.

Always follow the instructions of the teacher in the allocation of seats to fill.

Leave necessarily always visible on the table ID / Passport, writing utensils and possible materials authorized for testing.

Leave folders, bags and / or backpacks where the professor noted.

Mobile phones or any telecommunications device must be disconnected and stored in bags or backpacks. The use of these devices and some other unauthorized material is strictly forbidden. If it detects that a student has activated, it will be expelled from the examination with the consequences arising.

You can not answer pencil, nor red or green ink.

While performing tests all students must have the pinna (ear) discovered for verification that they are not using hearing aids not allowed. During the exam students must always have both hands visible.

Correction and absolute silence during the examination.

The teacher may expel any student test violates these standards, with the consequences arising.

GENERAL CRITERIA FOR THE CORRECTION OF TESTS

If you consider a section divided in approach ("We ..." "You ask ..."), development ("The application of Theorem with this hypothesis allows ...") and resolution ("In the expression of the theorem is replaced ... and simplifying get ... ") until the result, to gain score paragraph must be presented in an orderly and intelligible development.

One result is rejected if the source, that is to present a coherent development with the statement (no need to make an explicit approach, or copy or recreate the statement) is not indicated.

For maximum score is required, where applicable:

- Getting the correct numerical result with SI units (International System).
- Presenting graphic indicating the scales with correct units.
- Present schemes, block diagrams, etc. unambiguously.
- Pulchritude, conciseness, accuracy and clarity of presentation will be highly valued.

It is heavily penalized so could nullify the score in a section:

- The dimensional and conceptual errors in reasoning.
- The results without units or SI units are not.
- The numerical errors that lead to reasonable results only slightly penalized.

- Other numerical errors can become considered misconceptions.
- In chained questions are not heavily penalized errors arising from the above results, provided that taking these as data does not represent a conceptual error and the results derived are reasonable.

Bibliography

Título: ELECTRÓNICA

Autor/es: Hambley, Allan ;

Editorial: PRENTICE-HALL

Título: CIRCUITOS MICROELECTRONICOS. Análisis y diseño

Autor/es: Muhammad H. Rashid

Editorial: THOMSON

Título: AMPLIFICADORES OPERACIONALES Y CIRCUITOS INTEGRADOS LINEALES

Autor/es: Coughlin, Robert F. ; Driscoll, Frederick F.

Editorial: PRENTICE-HALL.

Título: CIRCUITOS ELECTRONICOS: DISCRETOS E INTEGRADOS

Autor/es: Donald L. Schilling - Charles Belove

Editorial: Mc Graw Hill

Título: ELECTRONICA: Teoria de Circuitos

Autor/es: Robert L. Boylestad - Louis Nashelsky

Editorial: Prentice Hall

Título: CIRCUITOS ELECTRONICOS: Análisis, Simulación y Diseño

Autor/es: Norbert R. Malik

Editorial: Prentice Hall

Título: MICROELECTRONICA: CIRCUITOS Y DISPOSITIVOS

Autor/es: Mark N. Horenstein

Editorial: Prentice Hall