CURSO : **ELECTRONICA PARA FISICOS II**
TRADUCCIÓN : ELECTRONICS FOR PHYSICISTS II
SIGLA : FIM3031
CRÉDITOS : 15
MÓDULOS : 1 TEORICO, 2 LABORATORIO
REQUISITOS : FIM3030
RESTRICCIÓN : 030401 Y 030501
CARÁCTER : OPTATIVO DE PROFUNDIZACION
SEMESTRE : SEGUNDO SEMESTRE

I.DESCRIPTION
The application of electronics in the research laboratory environment requires a wide range of electronics systems from control and management systems to the acquisition of data from a variety of sensors and transducers. Associated with these topics is the application of pulsed power techniques on topics from the generation of plasmas to radars for geological uses.

II.GOALS
Give the student of physics, or the applied science area, the conceptual tools to be able to understand and design measurement systems for physical parameters using sensors in real and adverse conditions, transfer and process the information so that reliable information is obtained. Understand and be able to specify and even design control systems for devices and experiences in an applied physics research laboratory and advanced teaching. Design and build a prototype of a data collection system, or experience control system, or equivalent, in the context of an advanced teaching or laboratory program, or an industrial application.

III.CONTENT
1.Measurement and Information
1.1.Generation and then detection and demodulation of signals without background noise problems. The phase locked loop, synchronous detection, PWM, FM, AM, PPM detection, Phase Modulation, and introduction to digital series, and coding.
1.2.Introduction to communication physics, autocorrelation function, concepts of convolution, correlation and filtering in digital sampling and analysis in the frequency and time regime.
1.3.Process signals digitally, filtering both analogically and digitally.
1.4.Strategies to detect signals in important background noise. Sources and calculations of noise levels. The Kalman filter. Information understanding, entropy.

2.Control systems:
2.1.Conceptualization of a research experiment. Examples taken from Research laboratories. Step-by-step analysis. Personal safety aspects.
2.2.Methods of communication and control of experiments.
2.3.Electronics in a pulsed YAG laser with cavity control.
2.4.Introduction to the PC-experiment interface. Examples, implementation and codes.
2.5.Necessary digital elements.
2.6 Presentation of the PIC.

3. Laboratory measurement and / or control project. Identification of a need in a Research or Teaching laboratory that could be developed in an experience over four or five weeks. It could be software or hardware, or an interface between them.

IV.METHODOLOGY

The methodology revolves around a series of laboratory experiences, of increasing complexity. From a lecture presentation of each experience and the way to computationally model it, the circuit and system are assembled, so that the comparison between theory and reality is the point where learning is achieved

V.EVALUATION

The course proposes tasks and small projects of deepening in areas of specific interest of the student on a fortnightly basis. There is a series of five laboratory experiences, and in addition, during the last five weeks the student will specify, design and carry out a small application project according to their interest and the availability of matter to be solved. The evaluation is progressive according to the tasks, experiences and projects carried out and reported.

VI.BIBLIOGRAPHY

Gabel, Robert A. and. Roberts, Richard A. Signals and Linear Systems, Wiley, 1982.

Hutchings, Howard Interfacing with C, Newnes, 1995.

Lynn, Paul A. An introduction to the Analysis and Processing of Signals, Macmillan, 1989.

Tooley, Mike PC-based Instrumentation and Control, Newnes, 1993.

Tompkins ,Willis J. and Webster, John G. Interfacing Sensors to the IBM PC, Prentice-Hall, 1987.