BRES2101 Electronics and measurement

[30h+22.5h exercises] 4 credits

This course is taught in the 2nd semester

Teacher(s): Francis Labrique
Language: French
Level: Second cycle

Aims

At the end of the course, the student must be able :
- to understand the functioning of the basic semi-conducting components and their use in the amplification, structuring, processing and transmission of data ;
- to design electronic devices for modifying the stage of an electric engine ;
- to understand and use analogue and digital electronic measurement devices ;
- to characterize the propagation of errors in a measurement chain ;
- to select appropriate measurement devices in terms of the monitoring objective ;
- to process information from a measurement chain ; and
- to organise a data base issued from electronic measurements.

Main themes

Part 1 : Electronics
- Basic tools for studying electro-technical and electronic devices
- Components of semi-conductors used in electronic circuits. Introduction of principle applications (amplification, structuring, processing and transmission of electronic signals). The following applications will be studied : power electronics and their applications, digital electronics (study of a microprocessor), analogue and digital instrumentation

Part 2 : Metrology
- Introduction to measurement error analysis
- Definition of measurement properties: sensitivity, resolution, derivative, threshold, hysteresis, extension, reproductivity, stability, precision, signal to noise ratio
- Choice and adaptation of measurement instruments in terms of the monitoring objectives
- Concept of analogue and digital information
- Measurement chain : sensors, interface and storage
- Processing of data (relation between numerical value, physical value, linearity, calibrations, #)
- Tele-measurement
- Organisation of data bases. Relation with geographical information systems. Decision support systems.

Exercises and laboratory.
The exercises and the laboratories envisage to train students in the use of electronic circuits and electronic measurement devices.

Other credits in programs

BIR22/0A	Deuxième année du programme conduisant au grade de bio-ingénieur: Sciences agronomiques (Technologies et gestion de l'information)	(4 credits)	Mandatory
BIR22/0C	Deuxième année du programme conduisant au grade de bio-ingénieur: chimie et bio-industries (Technologies & gestion de l'information)	(4 credits)	Mandatory
BIR22/0E	Deuxième année du programme conduisant au grade de bio-ingénieur: Sciences et technologies de l'environnement (Technologies et gestion de l'information)	(4 credits)	Mandatory
BIR22/2C	Deuxième année du programme conduisant au grade de bio-ingénieur : Chimie et bio-industries (Ingénierie biomoléculaire et cellulaire)	(4 credits)	
BIR22/7A	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Ressources en eau et en sol)	(4 credits)	Mandatory
BIR22/7E	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences et technologie de l'environnement (Ressources en eau et en sol)	(4 credits)	Mandatory