Faculty of Applied Sciences

MECA2845 Project work in mechatronics.

[30h+45h exercises] 6 credits

Teacher(s):   Paul Fisette (coord.), Ernest Matagne, Benoît Raucent
Language: French
Level: Second cycle

Aims

- Introduce students, via practice, to develop mechatronic engineering projects
- Foster creativity and solution seeking
- Promote a synthetic spirit and combining material learned by solving a real problem
- Allow students to construct a mechatronic prototype : a mobile robot

Main themes

- Analysis and description of a given technological problem
- Submission of a pilot project and performance evaluation
- Mechanical and electromechanical component dimensioning
- Taking technical and safety norms into consideration
- Presentation and defense of a complete and realistic technological solution
- Drawings of the manufacturing plans and design of an autonomous

Content and teaching methods

Students must take charge all the aspects of a proposed design problem. They particularly see to proposing innovative and technically correct solutions. The project will be advanced as far as possible including scale models, a final prototype and manufacturing plans for mechanical parts.
The project starts in September and ends during the month of May. It is done in groups and involves the following steps :
- Problem analysis and writing the specification conditions
- Seeking original solutions
- Quantification of the performances of each of the variants
- Solution selection (i.e. choosing the best variant)
- Presentation of the pilot project
- Mechanical and electromechanical component dimensioning
- Short economic study
- Drawings of the manufacturing plans of parts to be built in the workshop
- Private defense of the project and public of robot performance

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisite :
The project combines elements from the courses of mechanical design, electronics, computer science (real-time computing) , sensors and actuator control
References :
- RC. Juvinall and KM Marshek, Fundamentals of Machine Component Design, Wiley and Sons
- Technical documentation and Manufacturers'catalogues
Organisation :
- Unlike the mechanical design project (MECA 2840), the subject of this course (MECA2845) is imposed by the teachers.
- Groups : students work in groups of at least four. Before the pilot project, the group works together. Then, each one can specialize on a particular aspect.
- Schedule : Two to Four hours of consultation are foreseen each week all year.
- Accompaniment : besides the professors of the courses involved, each group has a tutor who will follow it all year. For that matter, the students are accompanied and aided by technical personnel of divisions PRM, LEI and DICE to construct the final robot.
- Locale : students have the mechatronic room at their disposal (Bâtiment Maxwell) equipped with mechanical tools and electronic and computing equipment. The guarantee for this equipment for the academic year involves a deposit to be determined (amount and time limit) will be set by the project coordinator at the beginning of the year.
Grading criteria :
- Principally based on presentations and technical reports done during the year and the robot built. Grading of course MECA 2845 involves three aspects : quality of the pilot project (including the design of a scale models before the final prototype)
- Mechanical design of the prototype (including the choice of materials, components, their dimensioning and manufacturing and assembly plans)
- Combining the disciplines involved (mechanics, actuator control, electronics, sensors, real-time computing)
N.B.: the other non MECA disciplines involved will be graded separately, in the context of an associated course

Other credits in programs

ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(6 credits)	Mandatory