A) COURSE

Course Id:	Course
5669	PROJECT INTEGRATOR IM

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	4	3	10	48 hrs Theory 64 hrs. Extra work 112 hrs Total.

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		IX			
Course Type (Required/Elective)		Obligatory			
Prerequisite Course:		Project Management			
CACEI Classification:		CI			

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:
To integrate knowledge and abilities acquired along the undergraduate studies, and to apply them to development and fabrication of a final product, functional and with real applications.

D) TOPICS (CONTENTS AND METHODOLOGY)

1. Methdology		**1 Hour**
Specific Objective:	**Objective 1.** That the student understands the methodology that will be used during the course and what is expected of him. Teams will be formed and projects will be allocated.	
1.1. Objective of the course. 1.2. Methodology. 1.3. Obligations and responsabilities of students. 1.4. Assessment. 1.5. Types of projects and selection. 1.6. Formation of work teams and projects assignment.		
Readings and other resources	Books, papers, complementary bibliography, internet pages.	
Teaching Methodologies	Presentation and explanation of topics in class, collaborative work, presentation of deliberations.	
Learning Activities	If needed, project proposal observation by the students.	

2. Draft project proposal	**8 Hours**

Specific Objective:	**Objective 2.** The student must be able to define the limits of the project based on the requirements, to carry out surveys, to propose and analyze potential solutions, to estimate costs and delivering times and to submit a proposal.
2.1. Project analysis. 2.1.1. QFD 2.1.2. Project definition 2.1.3. Project scopes. 2.2. Gathering information. 2.3. Intellectual property. 2.4. Conceptualization and creative generation of ideas. 2.5. Sensitivity and feasibility analysis 2.6. Operating forecast. 2.7. Generating basic engineering (preliminary design). 2.8. Preparation of proposal. 2.8.1. Cost estimation 2.8.2. Delivering time estimation 2.8.3. Preparation of proposal	
Readings and other resources	Internet pages, bibliography according to the project needs, consultancies and investigation, and supplier analysis.
Teaching Methodologies	Presentation in class, collaborative work, project-oriented learning.
Learning Activities	Analysis of requirements and specifications, investigation, ideas organization, creativity development to proposed possible solutions. Feasibility analysis, creativity and logic to develop the evaluation criteria, part list, critical components identification, quotations, cost estimations, delivering times, organization and project proposal elaboration.

3. Project	**36 Hours**
Specific Objective:	**Objective 3.** That the student conducts the following processes: organizations, research, design, control of documents, manufacture, assemble, product testing and product release.
3.1. Schedule. 3.2. Research and theoretical support. 3.3. Preparation of detailed engineering. 3.4. Purchase and manufacturing. 3.5. Product assembly. 3.6. Quality control. 3.7. Testing. 3.8. Cost analysis. 3.9. Product release.	
Readings and other resources	Books, papers, standards, complementary bibliography, internet pages.
Teaching Methodologies	Presentation and explanation of topics in class, problem-based learning.
Learning Activities	Team activities, homework assignment and discussion.

4. Validation	**3 Hours**
Specific Objective:	**Objective 4.** That the student analyzes the results obtained during all stages of the project; submit an operation manual of the product, a written report, a physical product and present a formal defense of his project.
4.1. Operation and maintenance manual. 4.2. Final report. 4.3. Defense.	

Readings and other resources	Internet pages, bibliography according to the project needs, consultancies.
Teaching Methodologies	Presentation in class, collaborative work, project-oriented learning.
Learning Activities	Investigation and analysis of information, knowledge application, suppliers contact, testing and results analysis. Weekly report elaboration, individual electronic portfolio, etc.

E) TEACHING AND LEARNING METHODOLOGIES

a) Presentation and explanation of topics in class.
b) Analysis and synthesis of concepts.
c) Development of a mechanical project based on the POL (Project Oriented Learning) methodology
d) Task planning and organization, electronic portfolio, presentation of partial progress reports, and the presentation of the final results of the project.

THE ROLE OF THE LECTURER (SUPERVISOR)
The lecturer will be the project supervisor and responsible of evaluating the progress of the projects weekly and considering the progress and the electronic portfolio. The supervisor will not act as an adviser, unless it is defined in the project proposal and work program, and only for those specific projects according to his/her area of expertise.

THE ADVISER
The adviser will be an expert selected as a guide to the students and able to advise the students in specific areas of the project. The main role of the adviser is to provide suggestions and solutions to the students, to propose references, and to provide technical knowledge to solve issues or problems of the project. The adviser can neither solve problems nor perform project activities. A list of advisers will be provided to the students at the beginning of each semester.
A team can go with different advisers, always making an appointment in advance, according to his/her available times.

THE PROJECT RESPONSIBLE
If the project is linked to an industry or a research project, there must be a project responsible. In the case of an industrial project, the project responsible must be a representative of the company or industry, and in the case of a research project the project responsible must be the research project responsible, who must evaluate weekly the project progress and send the evaluation to the lecturer. This evaluation must be based on the work program and a qualitative evaluation of the progress.

F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighting	Type
Analysis of requirements and task programming	Week 3	**10 %**	Team
Electronic portfolio evaluation	Weekly	**6 %**	Individual
Project progress	Weekly	**24 %**	Team
Knowledge exam	Week 15	**10 %**	Individual
Project final evaluation	End of semester	**50 %**	Team
Total		**100%**	

Others activities:	Development of an integrator project, that comprises: Physical product Calculation memory Operation and Maintenance manuals		
Second chance final exam	Week 17 of the semester in progress	100% Exam	100% topics
Third chance final exam	According to Secretary school setting	100% Exam	100% topics
Regularization Exam	According to Secretary school setting	100% Exam	100% topics

The *analysis of requirements and task programming* will be evaluated based on the following points:

- Requirements of the project.
- Project scopes.
- Feasible solutions to the problem.
- Evaluation Criteria.
- Design alternatives and their evaluation.
- Final solution and its details, including cost and delivering times of the final product.

Note: in case that some issues raise from this evaluation, the project may be changed or modified.

The personal *electronic portfolio* is a weekly report in which the student must include:

- The knowledge acquired form the project development.
- Personal contributions to the project.
- Team contributions to the project.
- Team situations and faced problems.
- An analysis of the work methodology and a proposal of how to improve it.
- Skill or abilities developed during the period.

Note: In the evaluation the lecturer must verify the personal analysis, the grammar and the orthography. Each report will have a value from 0% to 0.5% starting from the fourth week. The value of 0% is for those reports that were not provided or that do not fulfill the requirements.

The *weekly reports* will be evaluated by the lecturer and its mark will be based on the work program fulfillment.

The knowledge exam will have a maximum value of 10% and will be elaborated by the lecturer and applied in the classroom individually. Only the theoretical concepts taught in the course will be evaluated.

The *Project Final Evaluation* will comprise:

1. The operation and maintenance manual, which will be evaluated based on their contents (instructions, part list and maintenance recommendations) and elaboration (presentation and grammar).
2. The final report of the project, which will be evaluated based on its contents (theoretical background, specifications, design alternatives and solutions, project proposal, development of the best solution, testing, quality control, quality certification, cost analysis, materials list and conclusions) and elaboration (presentation and grammar).

Note: these two reports must be delivered in week 15, in order to be evaluated by the lecturer and evaluation committee.

3. The project presentation will be performed in week 16, an oral presentation of the team to the evaluation committee. The evaluation committee will be defined by the Project Acceptance Committee of the engineering program.

Notes:

1. In case of research projects, and calculation memories as final product, the evaluation criteria must be defined since the acceptance of the project at the beginning of the course.
2. In case that the project is not satisfactory completed and on time, it could be finished in the second or third chance periods. The evaluation committee will define the requirements that need to be accomplished in order to approve the project.

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main bibliography

Anexo 3: Guía Base Para los Programas Analíticos (Proyecto Mecatrónico).

Complementary bibliography

Aalborg University Press. The Aalborg Experiment. Project Innovation in University Education http://www.adm.aau.dk/rektor/aalborgeksperiment/engelsk/preface.html/ [17/04/2013]

Asimow, Morris. Introducción al proyecto, Herrero Hermanos. 5° Edición, México 1976. 187 pags.

James T. Luxhøj, Poul H.K. Hansen. (1996) Engineering Curriculum Reform at Aalborg University. http://www.jee.org/1996/july/94.pdf [18/05/2011]

Kevin Otto & Kristin Wood, Product Design. Techniques in reverse engineering and new product development, Prentice Hall, , 2001, eng,

Krick, E. V. Introducción a la Ingeniería y al Diseño de la Ingeniería Limusa. México 1986. 239 pags.
Schmelkes, Corina, Manual para la presentación de Anteproyectos e Informes de Investigación. Oxford, 2° Ed. México 1998.

Lecturer notes and manual.

Informatics resources