## ING1004 ENGINEERING CHALLENGES

**Credits and contact hours:**    10 UC credits / 10 hours (3h. Lectures; 1.5 h. Assistantship and 5.5 h. Independent learning experiences)

**Instructor's name:**    Section 1: Catalina Cortázar, Section 2: Robinson Gálvez
Section 3: Felipe Delgado, Section 4: Loreto Parra
Section 5: Sergio Vera, Section 6: Alfonso Cruz
Section 7: Felipe Lyon

**Course coordinator's name**    Catalina Cortázar

**Textbook:**    Grech M., Pablo. Introducción a la Ingeniería: un enfoque a través del diseño. Pearson Education 2001.
Shaw, Milton. Engineering problem solving. Noyes Publications, New Cork. 2001.
Chris, Lefteri. Making it: manufacturing techniques for product design. Laurence King. 2007.
Courage, Catherine & Baxter, Kathy. Understanding your users: a practical guide to user requirements. Methods, Tools & Techniques. Morgan Kaufmann, 2005.

**Course Catalog Description:**    *Desafíos de la Ingeniería* is a first year course that provides a learning experience in which students are challenged and motivated to perform engineering design projects. The course confronts students to the development of engineering design problems of current interests and containing implies components of community service. Their final design should be innovative, creative, functional, technically efficient, and of user relevance, It should be comparable to a proof-of-concept prototype that could be presented in search of financial support.
Course web: http://web.ing.puc.cl/~ing1004/

**Prerequisite Courses:**    Required

**Co-requisite Courses:**    None

**Status in the Curriculum:**    Required

**Course Learning Outcomes:**

1. Solve a real world problem (limited to a specific area of engineer design), applying the design methodology in engineering in a creative and innovative way. Produce a device that responds to inequalities of a specific group in terms of social, economic and / or environmental vulnerability.

1.1 Identify, define and formulate the problem using methods, empirical and analytical tools, computational and mathematical modeling, considering time and resource constraints.

1.2. Apply the fundamental concepts of engineering design process to solve the formulated problem.

1.3. Produce a creative and innovative proof-of-concept prototype that meets and responds to the requirements and needs identified in the definition and formulation of the problem.

2. Articulate individual contributions on teamwork to develop a common project.

2.1. Establish a collaborative work plan.

2.2 Define individual roles and responsibilities in the context of collaborative work.

2.3 Follow the development of the Project, anticipating and solving problems.

3. Develop safe and responsible behaviors in the laboratory, ensuring appropriate use of resources and the construction of an optimal product.

**Relation of Course to ABET Criteria:**

a. Knowledge of mathematics, science and engineering

c. Design a system, component, or process

d. Multidisciplinary teams

f. Professional and ethical responsibility

g. Effective communication

h. Broad education necessary for global, economic, environmental and societal context

i. Recognition of the need for, and an ability to engage in life-long learning

j. Knowledge of contemporary issues

k. Techniques, skills, and modern tools for engineering practice.

**Topics covered:**

- Group work Design Methodology
- Estimation
- Data analyzis
- Uncertainty
- Materials
- Statics
- Computer science and math modeling
- Oral Communication and presentation
- Information architecture
- Process and protoypes
- Skill oriented Workshops (Arduino, Inventor, Autocad, Illustrator, etc. )

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