PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: INDUSTRIAL DRAWING

MATTER: Graphical Engineering
MODULE: Specific Technology
PROGRAM TITLE: Degree on Industrial Technologies Engineering

GENERAL CHARACTERISTICS*

Type: ☐ Basic training, ☑ Compulsory elective, ☐ Optional
☐ Final degree project, ☐ Practicum

Duration: Semiannual **Semester/s**: 4
Number of credits ECTS: 6
Language/s: Spanish, Catalan, English

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION (the meaning of the course in relation to the studies. Between 100 and 200 words.)

The industrial design is the tool used to know how to communicate in writing with plans dimensions, tolerances, roughness and other requirements to manufacture, assemble, evaluate the quality ... a piece or pieces of a machine or installation
The course aims to introduce students to the different standard elements used in industry and for each of them to present their representation in plans so that students are able to create the plan according to the rules while reading or interpreting an existing one. The course content includes as essential views and standardized scales, dimensioning, surface states, tolerances and adjustments, removable binding elements (screws, nuts, bolts, grooved ...) fixed bonding (adhesive, welded, riveted ...) power transmission (gears, pulleys and belts, chains ...), bearings (bushings, bearings ...), pipe elements (flanges, elbows, fittings ...), facilities and installations • symbology (electrical, electronic, hydraulic ...).

COMPETENCES (of the course made in relation to preassigned competences in this area.)

• Ability to understand and apply the basic and technical skills, including: computer science, graphic expression, mechanics and materials, necessary for the practice of industrial engineering (E2).
• Ability to develop, plan and implement analytical and numerical methods for the development of mathematical models in the field of industrial engineering (E7).
• Ability to communicate effectively, both orally and in writing, to impart knowledge and skills in the field of industrial engineering (T1).
• Knowledge and ability to apply the techniques of engineering graphics (NT5).

PREREQUISITES* (modules, matters, courses and knowledge needed to follow the course. Can be stated that courses must have been completed.)
Competences of the earlier educational stages.

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CONTENTS (as a relationship of the chapters that constitute the contents, or topics covered, of the course to a second level detail.)

1. Views and standardized scales, dimensioning, surface states, tolerances and adjustments
2. Removable binding elements (screws, nuts, bolts, grooved ...)
3. Binding elements fixed (adhesive, soldier, riveting ...)
4. Power transmission components (gears, pulleys and belts, chains ...)
5. Bearings (bushings, bearings ...)
6. Elements of pipes (flanges, elbows, fittings ...)
7. • Services and facilities symbols (electrical, electronic, hydraulic ...)

METHODOLOGY

TRAINNING ACTIVITIES* (Complete the table relating activities, workload in ECTS credits, and competences.)

Training activities	ECTS Credits	Competences
Sessions presentation of concepts (A1)	2.0	E2, TE5
Sessions for resolution of exercises, problems and cases (A2)	2.0	E2,E7,T1,TE5
Seminars (A3)		
Personal mandatory activities professor-student (A4)		
Practical work / laboratory (A5)	1.5	E7,T1,TE5
Oral and writing presentations (A6)		
Personal study activities by students (A7)	0.2	E2,E7,T1,TE5
Evaluation activities (exams, tests,…) (A8)	0.3	E2,E7,T1,TE5
Jobs (A9)	0.3	E2,E7,T1,TE5
TOTAL	**6**	

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EXPLANATION OF THE TEACHING METHODOLOGY (justifying the teaching methods used in relation to the competences and course contents. Between 100 and 200 words.)

Most sessions of the course of lectures combined with practical parts parts resulting in several models of interaction in the classroom. The dynamic model exhibition in which the teacher shows the contents, the dynamic model demonstration in which the teacher performs tasks and solves problems and active dynamic in which students must complete a problem. This latest model is done both individually and in groups of students. New technologies allow the realization of these sessions with laptops connector network to share projects and divide tasks among students in real time.In addition the course provides a great burden laboratories where students are constantly working on his laptop in the resolution of problems that led to the beginning and incorporating theoretical knowledge for decision making becomes the responsibility of the student .For personal study the student has all the information in electronic format standardization as the subject requires constant consultation of tables and standards.

EVALUATION

EVALUATION METHODS* (Fill in the table relating evaluation methods, competences and weight in the qualification of the subject.)

Evaluation Methods	Weight	Competences
Final Exam (A)	40%	E2,E7,TE5
Examination / s Partial / s / control / s scheduled / s (B)	15%	E2,TE5
Activities done in class (C)	2%	E7
Exercises outside of class (D)	3%	T1,TE5
Reports realizats work (E)	9%	E2
Presentations and / or oral examinations (F)	1.5%	T1
Modeling, Proposed, etc.. (G)	7.5%	E7
Laboratory reports (H)	5%	E2,E7,T1,TE5
Practical work / lab (I)	15%	E2,E7,TE5
Work in other centers (Practicum) (J)		
Participations (K)	2%	E7,T1

LEARNING OUTCOMES (Explanation of the achievements of students that allow competences evaluation, relating to competences and evaluation methods.)

• Students must show an ability to read and write a plan according to regulations Industrial Drawing. (E2, E7, T1, NT5) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate that he is capable of calculating tolerances and adjustments made to incorporate parts surface quality requirements. (E2, E7, T1, NT5) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate that they know how to choose the pieces together so much

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mountable (screws, ...) and fixed (welding, ...). (E2, E7, T1, NT5) [A, B, C, D, E, F, G, H, I, K].
• Students must show an ability to recognize the different elements that can transmit mechanical power (gears, ...), to minimize friction (bearings), and other mechanisms such as joints. (E2, E7, T1, NT5) [A, B, C, D, E, F, G, H, I, K].
• The student must demonstrate that he knows the rules applicable to facilities installed • pneumatic, electrical and plumbing. (E2, E7, T1, NT5) [A, B, C, D, E, F, G, H, I, K].

QUALIFICATION (Explanation of the calculation system of qualifying the course.)
The course evaluation will consider all deliverables listed in the table with their weight for evaluation. A large part of the grade obtained at exams (A) 40% and will be adding to the note obtained during the course exam (B) 15%, activities performed in class (C) 2% exercises outside of class (D) 3%, reports of work done (E) 9%, Presentations and / or oral examinations (F) 1.5%, project development, (G) 7.5% laboratory reports (H) 5% workshop and laboratory work (I) 15%, and finally Participation (K) 2%. During the completion of the final exam will be given the opportunity to recover all deliverables to the student fails to achieve the minimum of four.
EVALUATION OF COMPETENCES (Defining expressions of calculation for each competence based on corresponding evaluations activities.)

To assess the competencies of the course E2, E7, T1, NT5 be used subsections of each deliverable facing students during the course. Each deliverable part of the grade will reflect the ability to reflect the concepts of graphic expression in the deliverable (E2). E7 analyzed to assess problem solving engineering and mathematical calculations using artifacts distances, calculate the mass of parts, geometric operations • trigonometry to help put the pieces in place ... Finally the jurisdiction that gives students the chance to understand plans that will be used later in many subjects and evaluated each year with the important concepts within the power NT5. Ultimately each year to assess 10 points assessed on each note stating competition.

TEXTBOOKS (recommended and accessible to students.)

- "Dibujo Industrial", Félez, Jesús; Martínez, M.Luisa; Síntesis Ingeniería, (1999), ISBN 84-7738-331-6
- 11 "Dibujo Industrial", Chevalier, A.; Editorial Limusa, (1999), ISBN 968-18-3948-X, IQS-744-Che. 8
- "Interpretación de planos (técnica-mecánica)", Esteban Rayo, Andrés; FC Editorial, (2002), ISBN 84-95428-41-5
- "Dibujo Técnico", Ramos Barbero, Basilio; García Maté, Esteban; AENOR, (2000), ISBN 84-8143-261-X
- "Dibujo Industrial. Conjuntos y Despieces", Auria Apilluelo, José M.; Ibáñez Carabantes, Pedro; Ubieto Artur, Pedro; Thomson-Paraninfo, (2004), ISBN 84-283-2729-7

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- "Normalización del dibujo técnico", Preciado, Cándido; Moral, Francisco Jesús; Editorial Donostiarra, (2004), ISBN 84-7063-309-0
- "Introducción a los circuitos eléctricos I-5E", Valentín Labarta, Jose Luis; Ed. Donostiarra, (1991), ISBN 84-7063-148-9
- "Introducción a los circuitos eléctricos II-6E", Valentín Labarta, Jose Luis; Ed. Donostiarra, (1994), ISBN 84-7063-153-5
- "Introducción a los circuitos eléctricos III-7E", Valentín Labarta, Jose Luis; Ed. Donostiarra, (1989), ISBN 84-7063-161-6
- "Introducción a los circuitos neumáticos I-1N", Valentín Labarta, Jose Luis; Ed. Donostiarra, (1992), ISBN 84-7063-175-6
- "Introducción a los circuitos neumáticos II-2N", Valentín Labarta, Jose Luis; Ed. Donostiarra, (1993), ISBN 84-7063-180-2
- "Test de normalización", Matute Royo, Manuel; Ed. Donostiarra, (1997), ISBN 84-7063-145-4
- "A Commands Guide Tutorial for Solidworks 2008", Planchard, David C.; Planchard, Marie P.; Thomson Delmar Learning, (2008), ISBN-10: 1-42835301-1, ISBN-13: 9781-4283-5301-5
- "El gran libro de SolidWorks Office Professional", Gómez González, Sergio; Marcombo, (2007), ISBN Marcombo 978-84-267-1458-9 ISBN Alfaomega 978-970-15-103-3
- "Reglamaneto Electrotécnico para Baja Tensión", Real Decreto 842/2002 de 2 de Agosto de 2002; Thomson Paraninfo, (2007), ISBN 978-84-283-2945-3

HISTORICAL DOCUMENT

EARLIER CHANGES
January 23, 2011, Dr. Andrés Amador García Granada
November 12, 2010, Dr. Andrés Amador García Granada
March 8, 2011, Dr. Andrés Amador García Granada

LAST REVISION

October 9, 2012, Eng. Ferran López Navarro