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Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering

Teaching unit: 717 - EGE - Department of Engineering Presentation

Academic year: 2019

Degree: BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)

ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Francisco Bermúdez Rodríguez

Degree competences to which the subject contributes

Specific:

1. DES: Ability to take decisions related to the graphic representation of concepts.

2. DES: Ability to apply specific methods, techniques and instruments for each form of technical drawing.

3. DES: Knowledge of the types of design and products, and their presentation.

Transversal:

4. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
6. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
7. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

Teaching methodology

- Face-to-face lecture and exercise sessions.
- Face-to-face practical sessions.
- Independent study, exercises, research and analysis of information.
- Preparation and completion of graded group activities.

Learning objectives of the subject

OAG1. Ensure students have the knowledge that will enable them to understand the standards and design systems used in industrial design, and to have the vision of space required to read all the plans that illustrate a design.

OAG2. Present standard and non-standard components related to industrial design for the purposes of conceiving and designing objects and mechanisms using a number of different CAD techniques.

OAG3. Ensure that as a result of the above, students have acquired the knowledge required that will enable them to

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graphically interpret and design any industrial design project.

OAG4. Become familiar with and use the generally accepted technical and graphic language used in industrial design.

Study load

Total learning time: 150h	Hours large group:	15h	10.00%
	Hours medium group:	0h	0.00%
	Hours small group:	45h	30.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

TOPIC 1: TYPES OF TECHNICAL DRAWINGS AND CONTENT

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
01.01. Drawings of industrial products: assemblies and disassemblies
01.02. Standard components
01.03. Graphic representations of industrial machinery and facilities
01.04. Graphic representations in civil engineering
01.05. Graphic representations in architecture
01.06. Graphic representations in industrial designs

TOPIC 2: SURFACE STATES AND SIGNS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
02.01. Classification of surfaces
02.02. Roughness. Characteristic concepts and parameters
02.03. Surface finish symbols
02.04. Indication of the surface finish in drawings (UNE-1037-83)
02.05. Indication of knurled surfaces (DIN-82)

TOPIC 3: DIMENSIONAL TOLERANCES AND FITS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
03.01. Introduction to tolerances and exchangeability
03.02. The concept of tolerance and characteristic parameters
03.03. Representation of tolerances by limits, deviations and class
03.04. The quality and position of tolerances
03.05. Preferred tolerances and general tolerances
03.06. The transfer of elevations
03.07. Concept, representation and indication of a fit
03.08. Types of fit and parameters
03.09. ISO fit systems: standard holders and standard shafts
03.10. Preferred fits

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TOPIC 4: STANDARD COMPONENTS IN THREADED JOINTS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
04.01. Thread systems and threaded components
04.02. Screws, bolts, pins, threaded rods, nuts, washers, safety washers and retaining rings.
04.03. Dimensional characteristics and geometric shapes
04.04. Standard names
04.05. Standard tables of components
04.06. Standard representation of threaded components and joints

TOPIC 5: STANDARD COMPONENTS IN UNTHREADED JOINTS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
05.01. Cylindrical, conical, butterfly winged, taper groove and roll pins
05.02. Pins and pegs
05.03. Dimensional characteristics and geometric shapes
05.04. Standard names
05.05 Standard tables of components
05.06. Standard representation of unthreaded components and joints
05.07. Representation of components in assembly drawings

TOPIC 6: SHAFTS AND DRIVE SHAFTS

Learning time: 5h

Theory classes: 0h 30m
Laboratory classes: 1h 30m
Self study : 3h

Description:
06.01. Standard geometries and dimensions
06.02. Graphic representation of drive shafts
06.03. Cylindrical and conical shaft ends (DIN 748 and DIN 1448)
06.04. Groove, ribbed and splined shafts. Standards and graphic representation
06.05. Representation of components in assembly drawings

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TOPIC 7: SPRINGS

Learning time: 5h

Theory classes: 0h 30m
Laboratory classes: 1h 30m
Self study : 3h

Description:
07.01. Classification according to shape, selection of the wire and type of load
07.02. Representation and dimensioning according to UNE-EN ISO 2162
07.03. View, cut and simplified representations of traction springs, compression springs, torsion springs, spiral springs and leaf springs
07.04. Table of characteristics of springs
07.05. Representation of springs in assembly drawings

TOPIC 8: PLAIN AND ROLLER BEARINGS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
08.01. Representation and dimensioning of plain bearings
08.02. Roller bearings: components, types, types of load and dimension series
08.03. Characteristics, regulations, standard names and the specific graphic representation of roller bearings: rigid ball bearings, angular contact ball bearings, swivel ball bearings, cylindrical rollers, conical rollers, thrust ball bearings, cylindrical roller bearings and needle roller bearings
08.04. General simplified and detailed representation of each type of roller
08.05. Radial and axial mounting of rollers. Representation and dimensioning
08.06. Gears. Graphic representation according to geometries and dimensions

TOPIC 9: GEAR TRANSMISSIONS

Learning time: 40h

Theory classes: 4h
Laboratory classes: 12h
Self study : 24h

Description:
09.01. Types: cylindrical with straight teeth, cylindrical with helical teeth, conical, worm and crown gears
09.02. Fundamental graphic dimensions and parameters. Definitions
09.03. Characteristics and dimensions
09.04. Standard representation of the different types of gear
09.05. Table of characteristics of a cogwheel

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TOPIC 10: CHAIN, CABLE AND BELT DRIVES

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
10.01. Types
10.02. Chain cable and belt drives. Definitions
10.03. Characteristics and dimensions
10.04. Standard and simplified representation

TOPIC 11: CAMS AND ECCENTRICS

Learning time: 10h

Theory classes: 1h
Laboratory classes: 3h
Self study : 6h

Description:
11.01. Definitions
11.02. Eccentrics. Types and laws of movement
11.03. Graphic representation of an eccentric. Layout
11.04. Cams. Standard layout and representation

TOPIC 12: WELDING

Learning time: 5h

Theory classes: 0h 30m
Laboratory classes: 1h 30m
Self study : 3h

Description:
12.01. Classification of welding procedures
12.02. Representation of welds. Graphic representations and symbols
12.03. Designation of welded joints
12.04. The UNE-EN 22553:1994 representation standard

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TOPIC 13: REPRESENTATIONS IN THE SHAPING OF SHEET METAL	Learning time: 5h Theory classes: 0h 30m Laboratory classes: 1h 30m Self study : 3h

Description:
13.01. Working with sheet metal
13.02. Development
13.03. Bending formulas
13.04. Deformation operations
13.05. Representations

TOPIC 14: CONSTRUCTION DRAWINGS	Learning time: 2h Theory classes: 0h 30m Laboratory classes: 1h 30m

Description:
14.01. Representation of construction components
14.02. Dimensioning in construction drawings
14.03. Representation and dimensioning of scales
14.04. Designation of buildings, components and compartmentalisation

TOPIC 15: GRAPHIC REPRESENTATIONS BASED ON DIAGRAMS	Learning time: 2h Theory classes: 0h 30m Laboratory classes: 1h 30m

Description:
15.01. Fluid handling facilities
15.02. Electrical installations in buildings
15.03. Electrical circuits in motors
15.04. Pneumatic and hydraulic installations

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Qualification system

The evaluation of knowledge acquisition, skills and abilities is made from:
- Individual and group work during the year: 50%
- Final exam for the course: 50%

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

Regulations for carrying out activities

Since the proposed methodological approach is based on continuous assessment practices and having a significant relative weight in the final grade, attendance, conduct and delivery of practices (on time for each of them) is considered mandatory. A practical assistance to less than 80% of the planned sessions, means that students can not be assessed in the same. The final grade of students with these characteristics correspond exclusively to the results in the examinations of the course.

Bibliography

Basic:

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Ramos Barbero, Basilio. Dibujo técnico. Madrid: AENOR, 2000. ISBN 9788481434743.

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Rodríguez de Abajo, F. J. Normalización del dibujo industrial. San Sebastián: Donostiarra, 1993. ISBN 8470631810.

Complementary:

Espinosa, M.M.; Domínguez, M. Expresión gráfica y diseño asistido en ingeniería. Madrid: AIDA, 2010. ISBN 9788461357710.

Espinosa, M. M.; Domínguez, M. Fundamentos de dibujo técnico y diseño asistido. Madrid: UNED, 2002. ISBN 9788436243482.