Course guides
320055 - EG - Engineering Graphics

Last modified: 29/05/2020

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 717 - EGE - Department of Engineering Presentation.

Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Francisco Bermúdez

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
4. MEC: Knowledge and capability for implementing engineering Graphics techniques.

Transversal:
1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

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

· Upon completion of this subject, students will have acquired: An understanding of the rules and representation systems used in mechanical design, as well as the spatial awareness needed to interpret the various plans that graphically document a project.
· An understanding of the standard and non-standard elements related to mechanical design that will enable the creation and design of various mechanisms using a series of different CAD applications.
· The knowledge required to graphically design any project.

STUDY LOAD

Type	Hours	Percentage
Hours small group	45,0	30.00
Self study	90,0	60.00
Hours large group	15,0	10.00

Total learning time: 150 h

CONTENTS

TOPIC 1: TYPES OF TECHNICAL DRAWINGS AND CONTENT

Description:
· Drawings of industrial products: assembly and breakdown drawings.
· Standardised elements.
· Graphic representation of equipment and industrial installations.
· Graphic representation in civil engineering.
· Graphic representation of industrial designs.

TOPIC 2: SURFACE FINISHES AND SYMBOLS

Description:
· Classification of surfaces.
· Roughness: concept and characteristic parameters.
· Surface finish symbols.
· Indication of surface finish on drawings. UNE-1037-83.
· Indication of knurled surfaces. DIN-82.

TOPIC 3: DIMENSIONAL TOLERANCES AND FITS

Description:
· Introduction to tolerances and interchangeability.
· Tolerance: concept and characteristic parameters.
· Representation of tolerances for limits, deviations and classes.
· Quality and position of tolerances.
· General and preferred tolerances.
· Dimensional transfer.
· Fit: concept, representation and indication.
· Types of fits and parameters.
· ISO fit systems: hole-base and shaft-base.
· Preferred fits.

TOPIC 4: GEOMETRIC TOLERANCES

TOPIC 5: STANDARDISED ELEMENTS OF THREADED FASTENERS

Description:
· Thread systems and threaded elements.
· Screws, bolts, studs, threaded rods, nuts, washers, lock washers and circlips.
· Dimensional characteristics and geometric shapes.
· Standard designation.
· Standard tables of elements.
· Standard representation of threaded elements and fasteners.

TOPIC 6: STANDARDISED ELEMENTS OF NON-THREADED FASTENERS

Description:
· Cylindrical pins, tapered pins, split pins, pins with threaded or elastic ends.
· Pins and pegs.
· Dimensional characteristics and geometric shapes.
· Standard designation.
· Standard tables of elements.
· Standard representation of elements and fasteners.
· Representation of elements in assembly drawings.

TOPIC 7: : DRIVE SHAFTS

Description:
· Standard geometries and dimensions.
· Graphic representation of drive shafts.
· Cylindrical and conical shaft ends (DIN 748 and DIN 1448).
· Splined, grooved and ribbed shafts. Standards and graphic representation.
· Representation of elements in assembly drawings.

TOPIC 8: SPRINGS

Description:
· Classification of springs by shape, coil cross-section and type of load.
· Representation and design according to UNE-EN ISO 2162.
· Multiview, cross-section and simplified representation of:
· Tension springs.
· Compression springs.
· Torsion springs.
· Spiral springs.
· Bow springs.
· Table of spring characteristics.
· Representation of springs in assembly drawings. P5. Morphology of positive volumetric displacement pumps.

TOPIC 9: FRICTION BEARINGS AND ROLLING-ELEMENT BEARINGS

Description:
· Representation and design of friction bearings.
· Rolling-element bearings: components, types, types of loads and size series.
· Characteristics, regulations, standard designation and specific graphic representation of rolling-element bearings:
· Rigid ball bearings.
· Angular contact ball bearings.
· Floating ball bearings.
· Cylindrical-roller bearings.
· Tapered-roller bearings.
· Floating roller bearings.
· Axial ball bearings.
· Needle bearings.
· General and specific simplified representation of each type.
· Radial and axial mounting of bearings. Graphic representation and design.
· Bearing seals. Graphic representation according to geometry and design.

TOPIC 10: GEAR-DRIVEN TRANSMISSIONS

Description:
Gear types:
· Cylindrical spur gears.
· Cylindrical helical gears.
· Bevel gears.
· Worm-and-gear sets.
· Basic graphic magnitudes and parameters. Definitions.
· Characteristics and dimensions.
· Standard representation of the different types of gears.
· Table of characteristics of toothed wheels.

TOPIC 11: CHAIN-, CABLE- AND BELT-DRIVEN TRANSMISSIONS

Description:
· Types.
· Basic graphic magnitudes and parameters. Definitions.
· Characteristics and dimensions.
· Standard and simplified representation.

TOPIC 12: CAMS AND ECCENTRIC WHEELS

Description:
· Definitions.
· Eccentric wheels. Types and laws of motion.
· Graphic determination of an eccentric wheel. Layout.
· Cams. Standard layout and representation.

TOPIC 13: WELDING

Description:
· Classification of welding procedures.
· Representation of welds. Graphic and symbolic representation.
· Designation of welded joints.
· Standard UNE-EN 22553:1994 on the representation of welded joints.

TOPIC 14: REPRESENTATION OF SHEET-METAL PART FORMATION

Description:
· Sheet metalworking.
· Development.
· Bending formulas.
· Deformation operations.

TOPIC 15: CONSTRUCTION DRAWINGS

Description:
· Representation of construction elements.
· Designing building plans.
· Representation and design of scales.
· Designation of buildings, elements and partitioning.

TOPIC 16: DIAGRAM-BASED GRAPHIC REPRESENTATION

Description:
· Fluid-transport installations.
· Electrical installations in buildings.
· Electrical circuits in motors.
· Pneumatic and hydraulic installations.

GRADING SYSTEM

A continuous assessment model will be in place, with the basic goal of taking into account students' ability to work both independently and in teams.
Knowledge acquisition, competencies and skills are assessed as follows:
- Individual and group work throughout 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.

EXAMINATION RULES.

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.