Last update: 03-07-2019

330510 - EG2 - Graphic Expression 2

Coordinating unit: 330 - EPSEM - Manresa School of Engineering
Teaching unit: 717 - EGE - Department of Engineering Presentation
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)
ECTS credits: 4,5 Teaching languages: English

Teaching staff

Coordinator: Lopez Martinez, Joan Antoni

Others: Romero Rodriguez, Jose Antonio

Degree competences to which the subject contributes

Basic:

CB1. The students have demonstrated to possess and to understand knowledge in an area of study that starts from the base of the general secondary education, and is usually found to a level that, although it relies on advanced textbooks, also includes some aspects that involve knowledge from the vanguard of their field of study.

CB2. Students can apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and problem solving within their area of study.

Specific:

CE5. Spatial vision capacity and knowledge of graphic representation techniques, both by traditional methods of metric geometry and descriptive geometry, and by computer aided design applications.

Generical:

CG3. Knowledge in basic and technological subjects that will enable them to learn new methods and theories and give them the versatility to adapt to new situations.

CG10. Ability to work in a multilingual and multidisciplinary environment.

Transversal:

1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.

2. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

3. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

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Teaching methodology

MD1 Master class or lecture (EXP)
MD2 Problem solving and case study (RP)
MD4 Directed theoretical and practical work (TD)
MD5 Small-scale project, activity or assignment (PR)
MD7 Assessment activities (EV)

The subject consists of three hours per week in a small group in the graphic expression laboratory, where theoretical concepts are taught and immediately worked on through practical exercises, using either traditional tools or computer-aided design (CAD) tools.

Learning objectives of the subject

- OAG05. To possess the knowledge that allows us to understand the norms and systems of representation in mechanical design, and the spatial vision necessary to read and interpret the plans for a project.
- OAG06. To present the standardised and non-standard elements related to mechanical design in order to conceive and design mechanisms through a series of CAD practices.
- OAG07. Capacity for spatial vision and knowledge of graphic representation techniques, either by traditional means of metric and descriptive geometry or using CAD applications.
- OAG08. Acquisition of the graphic language of mechanisms, machines and installations in the field of industrial engineering.
- OAG09. Experimentation with the use of graphic engineering and CAD applications.
- OAG10. To obtain the knowledge necessary for interpreting and carrying out the graphic design of any project.
- OAG11. Knowledge and skills to apply graphic engineering techniques.
- OAG12. Knowledge and skills for calculating, designing and testing machines.

Study load

Total learning time: 112h 30m	Hours large group:	0h	0.00%
	Hours medium group:	0h	0.00%
	Hours small group:	45h	40.00%
	Guided activities:	0h	0.00%
	Self study:	67h 30m	60.00%

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Content

Types of technical drawings and content

Learning time: 6h 25m

Practical classes: 2h 25m
Self study : 4h

Description:
01.01. Drawings of industrial products: assemblies and parts
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

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Surface finishing and symbols

Learning time: 6h 25m

Practical classes: 2h 25m
Self study : 4h

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)

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Dimensional tolerances and fits	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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 classes
03.04. The quality and position of tolerances
03.05. Preferred tolerances and general tolerances
03.06. The transfer of elevations
03.07. The 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

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Geometric tolerancing	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

Description:
03.11. Geometric tolerancing typology
03.12. Symbols and meanings
03.13. Norms on geometric tolerancing
03.14. UNE 1-121: 1991-1
03.15. Indication
03.16. Rectangle tolerance, reference elements
03.17. General tolerances

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Standard components in threaded joints	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Standard components in unthreaded joints	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

Description:
05.01. Cylindrical, conical, butterfly-winged, taper grooves 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

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Shafts and drive shafts	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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. Grooved, ribbed and splined shafts. Standards and graphic representation
06.05. Representation of components in assembly drawings

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Springs	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

Description:
07.01. Classification according to shape, selection of wire and type of load.
07.02. Representation and dimensioning according to UNE-EN ISO 2162.
07.03. Section 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.

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Bush and roller bearings

Learning time: 6h 25m

Practical classes: 2h 25m
Self study : 4h

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.

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Gears and trains

Learning time: 6h 25m

Practical classes: 2h 25m
Self study : 4h

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.

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Chain, cable and belt drives	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Cams and eccentrics	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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.

Related activities:
1,2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Welding	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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

Related activities:
1, 2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

Representations in the shaping of sheet metal	Learning time: 6h 25m Practical classes: 2h 25m Self study : 4h

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

Related activities:
1, 2

Specific objectives:
OAG05, OAG06, OAG07, OAG08, OAG11, OAG12

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Planning of activities

ACTIVITIES AND PROJECTS	Hours: 19h Self study: 8h 30m Practical classes: 10h 30m

Description:
Activities and projects aimed at using and acquiring subject knowledge. These can be individual or in groups.

Support materials:
Atenea material and CAD.

Descriptions of the assignments due and their relation to the assessment:
Oral presentation or Atenea.

Specific objectives:
OAG09, OAG10

Previous to final exam	Hours: 6h Practical classes: 3h Self study: 3h

Description:
Individual assessment test.

Support materials:
Exam papers.

Descriptions of the assignments due and their relation to the assessment:
Completed test.
10% of final mark.

Specific objectives:
OAG09, OAG10

Qualification system

A continuous assessment model is applied in order to assess both the independent work and the teamwork of the students.

Knowledge, skills and abilities will be assessed as follows:
- Individual and group work during the whole course: 40%
- Preliminary exam at the end of the course: 10%
- Final exam: 50%

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Regulations for carrying out activities

- Face-to-face sessions of content presentation and exercise solving.
- Face-to-face sessions of practical work.
- Independent work of studying, doing exercises and seeking and analysing information.
- Preparing and carrying out assessable group activities.

Bibliography

Basic:

Giesecke, Frederick E., i altres. Technical drawing with engineering graphics. 14th ed. Harlow: Pearson, 2014. ISBN 9781292026183.

Giesecke, Frederick E., i altres. Modern graphics communication. 4th ed. Upper Saddle River: Prentice Hall, 2010. ISBN 9780135151037.

Lockhart, Shawna D.; Johnson, Cindy M. Engineering design communication: conveying design through graphics. 2nd ed. Boston: Prentice Hall, 2012. ISBN 9780137057146.

Complementary:

Félez, J.; Martínez, M. L. Dibujo industrial. 3ª ed. rev. Madrid: Síntesis, 1999. ISBN 8477383316.

Félez, J.; Martínez, M. L. Ingeniería gráfica y diseño. Madrid: Síntesis, 2008. ISBN 9788497564991.

Others resources: