# COURSE DATA

<table>
<thead>
<tr>
<th>Data Subject</th>
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<tbody>
<tr>
<td>Code</td>
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<tr>
<td>Name</td>
</tr>
<tr>
<td>Cycle</td>
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<tr>
<td>ECTS Credits</td>
</tr>
<tr>
<td>Academic year</td>
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## Study (s)

<table>
<thead>
<tr>
<th>Degree</th>
<th>Center</th>
<th>Acad. year</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1404 - Degree in Industrial Electronic Engineering</td>
<td>School of Engineering</td>
<td>1</td>
<td>Second term</td>
</tr>
</tbody>
</table>

## Subject-matter

<table>
<thead>
<tr>
<th>Degree</th>
<th>Subject-matter</th>
<th>Character</th>
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<tbody>
<tr>
<td>1404 - Degree in Industrial Electronic Engineering</td>
<td>5 - Graphic expression</td>
<td>Basic Training</td>
</tr>
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## Coordination

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
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<tbody>
<tr>
<td>CASTELLO MORENO, JAIME</td>
<td>242 - Electronic Engineering</td>
</tr>
<tr>
<td>ESTEVE GOMEZ, VICENTE</td>
<td>242 - Electronic Engineering</td>
</tr>
</tbody>
</table>

## SUMMARY

This course is taught in the second semester of the first degree course in Industrial Electronics Engineering. Belongs to the basic training materials. This material is intended to give students an overview of graphic expression and its application in engineering. Provides the fundamental concepts of education vision in space and technical drawing, with special emphasis on the use of common software.

The course contents are:

- Representation techniques.
- Spatial conception.
- Standardization.
• Computer Aided Design.
• Fundamentals of industrial design.

The general objectives of the course are:

• Improve education of vision in the space-plane.
• From a given object in 3 dimensions, draw the views necessary to build it.
• From the analysis of the views of an object, build a drawing in axonometric system.

• Prepare drawings 2 and 3 dimensional with CAD tools.
• Use the drawing as a tool to explain "what is" or ideas and intentions (graphic expression).
• Students will use their powers of observation and analysis, sensitivity, retention, intuitive thinking and deduction.
• Recognize the graphic meta-language.
• Represent objects and mechanical parts by the use of drawing.
• Describe the methodology to be used in industrial design.
• Promote and improve student research skills.
• Be able to meet deadlines.
• Encourage the student's critical ability.

The theory classes will be taught in Spanish (or Valencian if applicable) and the practical and laboratory classes according to the information sheet available on the web of the degree.
There are no specified enrollment restrictions with other subjects of the curriculum.

**Other requirements**

No prerequisites

**OUTCOMES**

**1404 - Degree in Industrial Electronic Engineering**

- CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.

- CG16 - Ability for spatial vision and understanding of graphic representation techniques using both traditional methods of metric and descriptive geometry and computer-aided design applications.

**LEARNING OUTCOMES**

This course allows for the following learning outcomes:

- Know how to interpret technical plans and drawings in different systems of representation (CG3,CG16).

- Be able to represent on paper the 3-dimensional objects and to reconstruct and interpret by drawing the shape and position (CG3,CG16).

- Know and use different standards used in the technical representation (CG3,CG16).

- Understand the concepts of drawing and cutting set and its application in industrial design (CG3,CG16).

- Be able to use tools of computer aided design (CG3,CG16).

To complement the above results, this subject also to acquire the following skills:

- Manage effectively assisted drawing programs exposed.

- Compose and draw sheets.

- Know how to analyze and classify the exercises themselves critically.

- Know how to analyze and score a critical exercise of other groups.
• Find and select the information they require specialized bibliographic sources.

• Represent objects in three dimensions, to reconstruct and interpret through drawing its shape and position (spatial view).

• Know how to make charts and diagrams.

In addition to the specific objectives mentioned above, the course will encourage the development of several technical and social skills, among which include:

• Ability to work as a team (including resolution of problems between them).

• Ability to solve exercises using the full application of the knowledge acquired by the student from the notebook.

• Ability to deliver a comprehensive and organized notebook.

**DESCRIPTION OF CONTENTS**

1. **INTRODUCTION TO CAD SYSTEMS**

2. **TWO DIMENSIONS CAD**

3. **CAD CUSTOMIZATION**

4. **GEOMETRIC CONSTRUCTION**

   CIRCUMFERENCE: Circumference: definition and elements. Angles on a circle. Central, registered,


RINGS: Classification and definitions. Construction of squares, rectangles, rhombuses, rhomboids, trapezoids, and trapezoids.


5. PROPORTION AND SCALES
Proportionality: the height theorem, the theorem of the catheter and Power point. Similarity: Criteria of similarity of triangles.
Equal polygons. Condition for two polygons are directly equal. Equivalent role. Triangles and polygons equivalent Equicomposición. Applications.

6. TANGENCY AND POLARITY

7. CONICS AND FLAT TECHNICAL CURVES
8. REPRESENTATION SYSTEMS


9. 3D REPRESENTATION MODELS

Perspective projection. Affine transformations, drawing primitives, lighting and texturing. Introduction to 3D rendering programs.

10. INTRODUCTION TO THE STANDARDS


11. DIMENSIONING, TOLERANCES AND ADJUSTMENTS

and position. Object. Definitions and symbols. Directions to the drawings.

12. SYMBOLS
Generic symbols. Specific symbols. Applicable regulations.

13. FUNDAMENTALS OF INDUSTRIAL DESIGN
METHODOLOGY. Information, creativity and techniques. Brainstorming, combinatorial methods, ... Aesthetic design factors: laws of the psychology of form.


ASSEMBLY DRAWINGS AND PARTS. Drawing Concepts Joint Exploded parts list. Composition of assembly drawings and parts list. Guidelines assembly drawings (view selection, choice of scale, reference to the elements, to represent simple sets standards). Exploded. Rules to consider when making a list of parts.

14. MODELS OF REPRESENTATION OF CHARTS
Flow Charts, Block Diagrams, methodology and tools. Specific diagrams.

15. GRAPHIC EXPRESSION LABORATORY
Will undertake the following practices:

- geometric designs.

- Diagrams

- 2D representation

- 3D Rendering

- Standardization and dimensioning
WORKLOAD

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>Hours</th>
<th>% To be attended</th>
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</thead>
<tbody>
<tr>
<td>Laboratory practices</td>
<td>30,00</td>
<td>100</td>
</tr>
<tr>
<td>Theory classes</td>
<td>15,00</td>
<td>100</td>
</tr>
<tr>
<td>Classroom practices</td>
<td>15,00</td>
<td>100</td>
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<tr>
<td>Development of group work</td>
<td>5,00</td>
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<tr>
<td>Development of individual work</td>
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</tr>
<tr>
<td>Study and independent work</td>
<td>10,00</td>
<td>0</td>
</tr>
<tr>
<td>Preparation of evaluation activities</td>
<td>10,00</td>
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</tr>
<tr>
<td>Preparing lectures</td>
<td>15,00</td>
<td>0</td>
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<tr>
<td>Preparation of practical classes and problem</td>
<td>30,00</td>
<td>0</td>
</tr>
<tr>
<td>Resolution of case studies</td>
<td>5,00</td>
<td>0</td>
</tr>
<tr>
<td>Resolution of online questionnaires</td>
<td>5,00</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>150,00</strong></td>
<td></td>
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TEACHING METHODOLOGY

- Classroom work: theory classes, practical classes and laboratory classes (CG3,CG16).
- Student's home work: preparation of classes, solving of exercises and problems, job preparation and presentation of results (CG3,CG16).
- Individual and group tutorials (CG3,CG16).

EVALUATION

The assessment of student learning will be carried out following two models:

- A) By evaluating the activities carried out by the students, the laboratory practices and the grade of the examinations that are carried out.
- B) From the note of the tests of minimum knowledge that will be realized in the official date and of the qualification obtained in the laboratory practices.

To qualify for the evaluation mode A) the student must have attended 80% of the classes, have performed 80% of the proposed activities, have obtained in them an average grade of 5 or higher and have obtained in the Laboratory a rating equal to or greater than 5. The tests of this modality will be directed to verify that the fundamental concepts have been assimilated and the problem solving and resolution has been worked. The laboratory practices will contribute to the final grade of the subject with 50%. The note in this part will be the result of an ongoing evaluation of all laboratory sessions. In each one of them will be
evaluated the demonstrated skill, interest in the practice and development of this throughout the session. For the evaluation of the learning in the laboratory practices will be considered both the participation of the student in the preparation prior to the experimentation as well as the ability shown in the laboratory and the evaluation of the reports made (CG3,CG16).

In mode B) the test will consist of the resolution of a practical case in which the student must demonstrate his knowledge of the concepts and techniques seen in class and its application, assessing his ability to extract the information from the statement and raise the problem resolution. With the test, the student can only access 75% of the maximum mark. However, the student who opts for this modality will also value the work done during the course, provided that the grade of the test is equal to or greater than 4 and will be added to the grade of the test (CG3,CG16).

For the evaluation of the laboratory practices in this modality the student will have to give resolved all the Practices.

Students who opt for option A), and who do not approve the subject in the first call of this form, must present themselves to the test of the second call and the form of evaluation will be, then, the one of modality B).

In any case, the evaluation system will be governed by what is established in the Evaluation and Qualification Regulations of the University of Valencia for Degrees and Masters

REFERENCES

Basic

  DIBUJO GEOMÉTRICO y SISTEMAS DE REPRESENTACIÓN
- RIOJA CASTELLANO, Vicente. TÉCNICAS DE REPRESENTACIÓN. CONCEPTOS BÁSICOS. Edita servicio de publicaciones de la Universidad Politécnica de Valencia (SPUPV-2005-187)
- DOMÍNGUEZ RODRIGO, FJ y MARTI DOLZ, J. El sistema axonométrico. Primera parte. Edita servicio de publicaciones de la Universidad Politécnica de Valencia (SPUPV-92.199)