320004 - EGE - Graphic Expression in Engineering

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)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: JORDI VOLTAS i AGUILAR
Others: Jordi Voltas
Joaquim Marqués
Fina Pàmies
Adrianna Mas
Anna Pujol
Rafel Ruiz
Arnau Diaz
Ferran Mera

Degree competences to which the subject contributes

Specific:
1. IND_BASIC: Capability for spatial vision and an understanding of graphic representation techniques, using the traditional methods of metric and descriptive geometry as well as computer-aided design applications.

Transversal:
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. 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.
4. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.
Teaching methodology

- Face-to-face lecture sessions
Lectures are given using digital presentations. The presentations will be made available to students on the virtual campus before classes begin to help them follow them. The assessment will be based on mid-semester examinations (or an optional final examination for students who fail the first one).
- Face-to-face practical work sessions
During practical work sessions, students work individually or in small groups of 2-3 on problems and questions under the lecturer’s supervision. A collection of problems will be made available on the virtual campus. Systems for self-assessment (with assessment criteria or rubrics), co-assessment (among students) and delivery of reports, corrected by the teacher and returned, are made available to facilitate independent learning.
- Face-to-face laboratory work sessions
Students work in pairs during laboratory sessions. Guidelines for practicals will be made available to students on the virtual campus at the start of the course. Students must hand in a report for each practical. Marks will be based on the work carried out in the laboratory and the reports handed in.

Learning objectives of the subject

On completion of the course, students should be able to:
- Correctly use and interpret the language and basic concepts of Chemistry.
- Recognise the structure of matter and relate it to the physical and chemical properties of organic and inorganic substances.
- Apply stoichiometric calculations to solve problems.
- Recognise the equipment and apply the basic techniques of the chemistry laboratory.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>0h</th>
<th>0.00%</th>
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<tbody>
<tr>
<td>Hours medium group:</td>
<td>60h</td>
<td>40.00%</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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### TOPIC 1: PLANE GEOMETRY

**Description:**
1.1. Tangencies and tangential contacts.
1.2. Conic sections.
1.3. Technical curves.

**Related activities:**
AV0 and AV1 (CTP1), AV2 (SPP1), AV3 (AINP1), AV4 (CTP2), AV5 (SPP2), AV6 (AINP2), AV7 (CTP3), AV8 (SPP3) and AV9 (AGNP1).

**Specific objectives:**
For students to:
OE1. Formulate the principles and basic techniques of plane geometry.
OE2. Understand the formulation of geometry exercises on the basis of graphic and textual descriptions.
OE3. Find solutions to plane geometry problems.

<table>
<thead>
<tr>
<th>Learning time: 30h</th>
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<tbody>
<tr>
<td>Practical classes: 12h</td>
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<tr>
<td>Self study: 18h</td>
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</tbody>
</table>

### TOPIC 2: SOLID GEOMETRY

**Description:**
2.1. Projections and representation systems: basic operational techniques.
2.2. Point, line and plane. Relative positions.
2.3. Conditions of perpendicularity, parallelism and belonging.
2.4. Distances.
2.5. Angles.

**Related activities:**
AV10 (CTP4), AV11 (SPP4), AV12 (AINP3), AV13 (CTP5), AV14 (SPP5), AV15 (AINP4), AV16 (CTP6), AV17 (SPP6), AV18 (AINP5), AV19 (CTP7) AV20 (SPP7), AV21 (AINP6), AV22 (CTP8), AV23 (SPP8), AV24 (AGNP2) and AV25 (CPP1).

**Specific objectives:**
For students to:
OE4. Understand the principles that determine solid geometry.
OE5. Understand the descriptions of problems focusing on spatial situations and relationships.
OE6. Find graphical solutions to spatial problems.
OE7. Understand the functioning of the main representation systems used in engineering.
OE8. Make proper use of these representation systems to find solutions to problems.

<table>
<thead>
<tr>
<th>Learning time: 60h</th>
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<tbody>
<tr>
<td>Practical classes: 24h</td>
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<tr>
<td>Self study: 36h</td>
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### TOPIC 3: INDUSTRIAL STANDARDISATION

<table>
<thead>
<tr>
<th>Description:</th>
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| 3.1. Introduction. Industry standards.  
| 3.2. Freehand technical drawing.  
| 3.3. Obtaining standardised views.  
| 3.4. Treatments: cuts, sections and breaks.  
| 3.5. Dimensioning: guidelines for industrial dimensioning.  
| 3.6. Screw threads and other standardised items.  
| 3.7. Graphic representation of industrial assemblies.  
| Related activities: |  
| AV26 (CTP9), AV27 (SPP9), AV28 (AINP7), AV29 (CTP10), AV30 (SPP10), AV31 (AGNP3), AV32 (CTP11), AV33 (SPP11), AV34 (CTP12), AV35 (SPP12), AV36 (CTP13), AV37 (PTG) and AV38 (CPP2).  
| Specific objectives: |  
| For students to:  
| OE9. Understand and correctly apply the rules for industrial technical drawing.  
| OE10. Identify errors in the application of the rules for industrial technical drawing and make the necessary corrections.  
| OE11. Develop virtual prototypes in a 3D environment.  

### Learning time:
- Practical classes: 24h
- Self study: 36h
### Planning of activities

| AV1: (CTP1) PLANE GEOMETRY | Hours: 0h 35m  
Practical classes: 0h 35m |
|-----------------------------|--------------------------|
| AV0: PRESENTATION OF THE SUBJECT | Hours: 0h 10m  
Practical classes: 0h 10m |
| AV2: (SPP1) TANGENCIES AND TANGENTIAL CONTACTS. | Hours: 3h 15m  
Practical classes: 3h 15m |
| AV3: (AINP1) | Hours: 6h  
Self study: 6h |
| AV4: (CTP2) PLANE GEOMETRY (II) | Hours: 0h 45m  
Practical classes: 0h 45m |
| AV5: (SPP2) | Hours: 3h 15m  
Practical classes: 3h 15m |
| AV6: (AINP2) | Hours: 6h  
Self study: 6h |
| AV7: (CTP3) PLANE GEOMETRY (III) | Hours: 0h 45m  
Practical classes: 0h 45m |
| AV8: (SPP3) | Hours: 3h 15m  
Practical classes: 3h 15m |
| AV9: (AGNP1) | Hours: 6h  
Self study: 6h |
### AV10: (CTP4) SOLID GEOMETRY
**Hours:** 0h 45m  
Practical classes: 0h 45m

### AV11: (SPP4)
**Hours:** 3h 15m  
Practical classes: 3h 15m

### AV12: (AINP3)
**Hours:** 6h  
Self study: 6h

### AV13: (CTP5). SOLID GEOMETRY (II)
**Hours:** 0h 45m  
Practical classes: 0h 45m

### AV14: (SPP5)
**Hours:** 3h 15m  
Practical classes: 3h 15m

### AV15: (AINP4)
**Hours:** 6h  
Self study: 6h

### AV16: (CTP5). SOLID GEOMETRY (III)
**Hours:** 0h 45m  
Practical classes: 0h 45m

### AV17: (SPP6)
**Hours:** 3h 15m  
Practical classes: 3h 15m

### AV18: (AINP5)
**Hours:** 6h  
Self study: 6h

### AV19: (CTP7). SOLID GEOMETRY (IV)
**Hours:** 0h 45m  
Practical classes: 0h 45m
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tr>
<td>AV20: (SPP7)</td>
<td></td>
<td>3h 15m</td>
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<td>Practical classes: 3h 15m</td>
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<tr>
<td>AV21: (AINP6)</td>
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<td>6h</td>
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<td>Self study: 6h</td>
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<tr>
<td>AV22: (CTP8)</td>
<td>SOLID GEOMETRY (V)</td>
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<td>AV23: (SPP8)</td>
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<td>AV24: (AGNP2)</td>
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<td>12h</td>
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<td>Self study: 12h</td>
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<td>AV25: (CPP1)</td>
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<td>3h 15m</td>
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<td>Laboratory classes: 3h 15m</td>
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<td>AV26: (CTP9)</td>
<td>INDUSTRIAL STANDARDISATION (I)</td>
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<td>AV27: (SPP9)</td>
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<td>AV28: (AINP7)</td>
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<td>AV29: (CTP10)</td>
<td>INDUSTRIAL STANDARDISATION (II)</td>
<td>0h 45m</td>
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<td>Practical classes: 0h 45m</td>
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<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Hours</th>
<th>Practical Classes</th>
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<tr>
<td>AV30: (SPP10)</td>
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<td>AV31: (AGNP3)</td>
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<td>30h</td>
<td>Self study: 30h</td>
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<td>AV32: (CTP11) INDUSTRIAL STANDARDISATION (III)</td>
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<td>0h 45m</td>
<td>Practical classes: 0h 45m</td>
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<td>AV33: (SPP11)</td>
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<td>3h 15m</td>
<td>3h 15m</td>
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<td>AV34: (CTP12) INDUSTRIAL STANDARDISATION (IV)</td>
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<td>0h 45m</td>
<td>Practical classes: 0h 45m</td>
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<td>AV35: (SPP12)</td>
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<td>3h 15m</td>
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<td>AV36: (CTP13) INDUSTRIAL STANDARDISATION (V)</td>
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<td>0h 45m</td>
<td>Practical classes: 0h 45m</td>
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<td>AV37: (PTG)</td>
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<td>3h 15m</td>
<td>Practical classes: 3h 15m</td>
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<tr>
<td>AV38: (CPP2) EXAMINATION</td>
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<td>4h</td>
<td>Laboratory classes: 4h</td>
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**Qualification system**

30% First examination  
30% Second examination  
5% Laboratory sessions  
15% Application/practicals  
10% Sketch I  
10% Sketch II

Unsatisfactory results of the "First examination" may be taken through the hand-drawn test called "Sketch II" (to be done during class time), only for marks under 5. The grade obtained will be recorded as a grade in the "Sketch II" test and, if it is higher than the "First examination" test, it will replace the initial grade, maximum possible is 5.

**Regulations for carrying out activities**

To pass the subject, students must complete the laboratory practicals and hand in the necessary reports.
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

General

http://www.isftic.mepsyd.es/jovenes/dibujo_tecnico/.
http://ocw.unican.es/ensenanzas-tecnicas/expresion-grafica-y-dao/material-de-clase

Geometría Plana


Geometría Espacial


Normalització Industrial

http://ocw.upm.es/expresion-grafica-en-la-ingineria/dibujo-industrial-ii/material-de-clase/

CAD (Tutorials)