

**1. General information****Course:** GRAPHIC ENGINEERING**Type:** CORE COURSE**Degree:** 421 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING**Center:** 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 56388**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 20**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** JESUS MIGUEL CHACON MUÑOZ - Group(s): 20

| Building/Office   | Department                     | Phone number | Email                      | Office hours                            |
|-------------------|--------------------------------|--------------|----------------------------|-----------------------------------------|
| Politécnico/2-A08 | MECÁNICA ADA. E ING. PROYECTOS | 926295486    | jesusmiguel.chacon@uclm.es | Monday 9:30-11:30; Wednesday 9:30-13:30 |

**Lecturer:** FRANCISCO JAVIER SANCHEZ-REYES FERNANDEZ - Group(s): 20

| Building/Office   | Department                     | Phone number | Email                       | Office hours                                    |
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| Politécnico/2-A09 | MECÁNICA ADA. E ING. PROYECTOS | 926295463    | javier.sanchezreyes@uclm.es | Tuesday and Thursday, 11:30-13:00 y 18:30-20:00 |

**2. Pre-Requisites**

For the students to reach the learning objectives, it is recommended that they have previously achieved the essential competencies developed in the subject of Graphic Expression. In addition, they must possess a background and skill in instrument handling, which is supposed to be guaranteed in their training before their access to the University: basic knowledge of geometry and trigonometry, and basic skills of "spatial reasoning" and handling of traditional instruments of drawing and computers.

**3. Justification in the curriculum, relation to other subjects and to the profession**

Compulsory subject designed to achieve the competence of specific technology in Mechanics related to the knowledge and skills to apply graphic engineering techniques.

**4. Degree competences achieved in this course****Course competences**

| Code  | Description                                                                                                                                                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CB01  | Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge. |
| CB02  | Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.                                                                |
| CB03  | Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.                                                                                |
| CB04  | Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.                                                                                                                                                           |
| CB05  | Have developed the necessary learning abilities to carry on studying autonomously                                                                                                                                                                               |
| CEM01 | Knowledge and capacities to apply the techniques of graphical engineering.                                                                                                                                                                                      |
| CG03  | Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.                                                                                                           |
| CG04  | Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.                                                              |
| CG06  | Ability to handle specifications, regulations and mandatory standards.                                                                                                                                                                                          |
| CG08  | Ability to apply quality principles and methods.                                                                                                                                                                                                                |
| CT01  | Knowledge of a second language.                                                                                                                                                                                                                                 |
| CT02  | Knowledge and application of information and communication technology.                                                                                                                                                                                          |
| CT03  | Ability to communicate correctly in both spoken and written form.                                                                                                                                                                                               |

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Extension of knowledge on standardisation to tolerances.

Knowledge of elements commonly used in industry (threads, keys, gears, bearings). Knowing what they are, how they are used and their standardised representation.

Ability to interpret drawings, not only of isolated elements, but also of overall plans, distinguishing the functions of each element.

Ability to manipulate and generate 3D representations on a computer using 2D input/output peripherals.

Ability to use complex design shapes, beyond natural quadrics.

Ability to select the appropriate instruments for each particular case.

## 6. Units / Contents

**Unit 1: Industrial assembly drawings**

**Unit 2: Machine elements and fasteners**

**Unit 3: Tolerancing and engineering fits**

**Unit 4: Solid and surface modeling**

## 7. Activities, Units/Modules and Methodology

| Training Activity                             | Methodology                   | Related Competences<br>(only degrees before RD 822/2021) | ECTS                                 | Hours | As | Com | Description                                          |
|-----------------------------------------------|-------------------------------|----------------------------------------------------------|--------------------------------------|-------|----|-----|------------------------------------------------------|
| Class Attendance (theory) [ON-SITE]           | Lectures                      | CEM01                                                    | 0.8                                  | 20    | N  | -   | Participative lecture, with blackboard and projector |
| Problem solving and/or case studies [ON-SITE] | Problem solving and exercises | CEM01 CG04                                               | 0.8                                  | 20    | N  | -   | Problem solving in a participative way               |
| Class Attendance (practical) [ON-SITE]        | Combination of methods        | CEM01 CG04 CT01 CT02                                     | 0.6                                  | 15    | Y  | N   | Practical CAD sessions                               |
| Study and Exam Preparation [OFF-SITE]         | Self-study                    | CB05 CEM01                                               | 3.6                                  | 90    | N  | -   | Self study                                           |
| Formative Assessment [ON-SITE]                | Assessment tests              | CB01 CB02 CB03 CB04<br>CB05 CEM01 CG03 CG04<br>CG06 CT03 | 0.2                                  | 5     | Y  | Y   | Open-book practical exam                             |
| Total:                                        |                               |                                                          | 6                                    | 150   |    |     |                                                      |
| Total credits of in-class work: 2.4           |                               |                                                          | Total class time hours: 60           |       |    |     |                                                      |
| Total credits of out of class work: 3.6       |                               |                                                          | Total hours of out of class work: 90 |       |    |     |                                                      |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

## 8. Evaluation criteria and Grading System

| Evaluation System                                  | Continuous assessment | Non-continuous evaluation* | Description                                        |
|----------------------------------------------------|-----------------------|----------------------------|----------------------------------------------------|
| Final test                                         | 67.00%                | 67.00%                     | N1 = Exam (final test)                             |
| Assessment of activities done in the computer labs | 33.00%                | 33.00%                     | N2 = Assignment (CAD modeling of a real mechanism) |
| <b>Total:</b>                                      | <b>100.00%</b>        | <b>100.00%</b>             |                                                    |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

### Evaluation criteria for the final exam:

#### Continuous assessment:

Minimum grades:  $N1 \geq 4$  AND  $N2 \geq 4$

Final grade (if both conditions are fulfilled) =  $(2N1 + N2)/3$

#### Non-continuous evaluation:

Minimum grades:  $N1 \geq 4$  AND  $N2 \geq 4$

Final grade (if both conditions are fulfilled) =  $(2N1 + N2)/3$

### Specifications for the resit/retake exam:

Minimum grades:  $N1 \geq 4$  AND  $N2 \geq 4$

Final grade (if both conditions are fulfilled) =  $(2N1 + N2)/3$

### Specifications for the second resit / retake exam:

Minimum grades:  $N1 \geq 4$  AND  $N2 \geq 4$

Final grade (if both conditions are fulfilled) =  $(2N1 + N2)/3$

## 9. Assignments, course calendar and important dates

| Not related to the syllabus/contents                                            |       |
|---------------------------------------------------------------------------------|-------|
| Hours                                                                           | hours |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                | 20    |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises] | 20    |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]               | 15    |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                               | 90    |
| Formative Assessment [PRESENCIAL][Assessment tests]                             | 5     |
| Global activity                                                                 |       |
| Activities                                                                      | hours |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises] | 20    |
| Class Attendance (practical) [PRESENCIAL][Combination of methods]               | 15    |
| Formative Assessment [PRESENCIAL][Assessment tests]                             | 5     |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                               | 90    |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                | 20    |
| <b>Total horas: 150</b>                                                         |       |

| 10. Bibliography and Sources            |                                                                                                                                                                                                                                                    |                                        |              |                   |      |                               |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------|-------------------|------|-------------------------------|
| Author(s)                               | Title/Link                                                                                                                                                                                                                                         | Publishing house                       | Citv         | ISBN              | Year | Description                   |
| Auria, J.M., Ibáñez, P., Ubieta, P.     | Dibujo Industrial. Conjuntos y Despiece (2ª ed)<br><a href="https://www.paraninfo.es/catalogo/9788497323901/dibujo-industrial--conjuntos-y-despieces">https://www.paraninfo.es/catalogo/9788497323901/dibujo-industrial--conjuntos-y-despieces</a> | Paraninfo                              |              | 84-9732-390-4     | 2005 |                               |
| Company, P., Vergara, M., Mondragón, S. | Dibujo Industrial<br><a href="https://www.tenda.uji.es/pls/iglu/!GCPA00.GCPPR0002?lg=CA&amp;id_art=751">https://www.tenda.uji.es/pls/iglu/!GCPA00.GCPPR0002?lg=CA&amp;id_art=751</a>                                                               | Publicacions de la Universitat Jaume I | Castellón    | 978-84-8021-603-6 | 2007 |                               |
| Sergio Gómez González                   | El gran libro de SolidWorks<br><a href="https://www.marcombo.com/el-gran-libro-de-solidworks-3aed-9788426726575/">https://www.marcombo.com/el-gran-libro-de-solidworks-3aed-9788426726575/</a>                                                     | Marcombo                               |              | 9788426726575     | 2019 |                               |
| Sánchez-Reyes, J., Chacón, J.M.         | Apuntes de la asignatura<br><a href="https://campusvirtual.uclm.es/">https://campusvirtual.uclm.es/</a>                                                                                                                                            | UCLM                                   | Ciudad Real  |                   | 2023 |                               |
| Tran, P.                                | SolidWorks 2023. Basic Tools<br><a href="https://www.sdcpublications.com/Textbooks/SOLIDWORKS-2023-Basic-Tools/ISBN/978-1-63057-548-9/">https://www.sdcpublications.com/Textbooks/SOLIDWORKS-2023-Basic-Tools/ISBN/978-1-63057-548-9/</a>          | SDC Publications                       | Mission (KS) | 978-1630575489    | 2023 | Texto básico sobre SolidWorks |
| Félez, J., Martínez, M.L.               | Ingeniería gráfica y diseño<br><a href="https://www.sintesis.com/ebook/ingenieria-42/ingenieria-grafica-y-diseno-ebook-694.html">https://www.sintesis.com/ebook/ingenieria-42/ingenieria-grafica-y-diseno-ebook-694.html</a>                       | Síntesis                               |              | 978-84-975649-9-1 | 2008 |                               |
| Preciado Barrera, C.                    | Normalización del dibujo técnico: Escuelas de ingeniería. C<br><a href="http://www.editorialdonostiarra.com">www.editorialdonostiarra.com</a>                                                                                                      | Donostiarra                            |              | 84-7063-309-0     | 2004 |                               |