Universidad Zaragoza

Year : 2019/20

30103 - Graphic expression and computer-assisted design

Syllabus Information

Academic Year: 2019/20
Subject: 30103 - Graphic expression and computer-assisted design
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
179 - Centro Universitario de la Defensa - Zaragoza
Degree: 457 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering
425 - Bachelor's Degree in Industrial Organisational Engineering
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module: ---

1.General information

1.1.Aims of the course

The course has as main objectives, on the one hand, to develop the capacity of spatial vision of the student, and on the other hand, to transmit skills that allow him to express accurately and clearly graphic solutions in the different representation systems.

In addition, the knowledge and management of the Computer Aided Design (CAD) will provide students communication tools to be used at all stages of their professional life.

1.2.Context and importance of this course in the degree

As a course in the first year of engineering degree in industrial management, its approach is similar to the study of other basic disciplines common to other degrees in engineering. In particular, through the knowledge of the various techniques of graphic representation, both by traditional methods and by the use of computer aided design software, the student will be able to communicate in an international language. In addition, the development of spatial vision will allow students to represent devices, distribute spaces and interpret information within their future professional environment.

1.3.Recommendations to take this course

To follow the course, the student should have a general knowledge of the contents of the course of technical drawing of baccalaureate. In particular, they should know the constructions of: triangles, quadrilaterals, regular polygons, technical curves, conical and cyclic curves.

2.Learning goals

2.1.Competences

Passing this course the student will be more competent for....

1.- Specific competences.

- Capacity for spatial vision and knowledge of graphic representation techniques whether through traditional methods of metric geometry and descriptive geometry or through computer-assisted design applications.

2.- Generic competences

- Ability to use techniques, skills and tools necessary to practise engineering
- Students have developed the learning skills necessary to undertake further studies with a high degree of autonomy.

2.2.Learning goals

- Students know and apply the different techniques of graphic representation for parts and assemblies: Sketch, normalization, orthographic projection system, perspectives and CAD.

- Students know and apply the current regulations of engineering drawing correctly.
- Students are capable of carrying out, identifying and interpreting the information contained in the drawings of different activities within the engineering sector.

2.3.Importance of learning goals

- Students dominate the resolution of the graphic problems that can be posed in the engineering
- Students develop skills and abilities that allow them to express with precision, clarity, objectivity and universality graphic solutions.
- Students acquire abstraction capacity to be able to view an object from different positions of space.

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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The student must demonstrate that he has assimilated the expected teaching through the following assessment activities:

a) Theoretical and Practical Exams

The Theoretical and Practical Exams evaluate in a general way: the precision and cleanliness in the layout; the dimensioning and scaling of the representation; the knowledge and application of current regulations, etc.

Throughout the quarter and in a manner that is coordinated with the rest of the subjects, a written exam will take place, which will correspond with the first block (B1) of the subject matter (around 50% of the theoretical and practical contents of the subject). Obtaining a grade of 4 and above in this evaluation will exempt the student of repeating the first block (B1) of the subject matter in the final examination of the course. Should this be the case, the student must participate in the examination of the second block (B2) of the theoretical and practical subject matter of the course (around 50% of the theoretical and practical contents of the subject). On the other hand, if the grade is below 4 in the written exam throughout the quarter, then the student must attend the final examination of the first call of the examination, which consists of blocks B1 and B2.

The final grade (FG) of the theoretical and practical examinations as a 10-grade score, will be the following:

FG=0.5 * B1 grade + 0.5 * B2 grade

In order to pass the course in the first call of the subject, the student must obtain a grade equal to 5 or higher.

The grades for each of the two blocks separately are not maintained for the rest of the calls of the present academic course, nor for the next ones. Therefore, the final Theoretical and Practical Exam of the second call (August) will not have an explicit separation of the two blocks.

b) DAO test

During the quarter, there will be a DAO test. This test will evaluate the modelling of the pieces, the definition of sketches, the complete definition of assemblies, the correct execution of plans, etc, with the use of the DAO tools.

Obtaining a grade of 5 or above will exempt the student from taking a DAO test in the final examination. If the grade of the DAO test in the first call is equal to or above 5, the grade will be maintained for the rest of the calls of the academic course, but in none of the calls in the next course.

The final grade of the subject will be a weighted average of the Theoretical and Practical Examination (minimum weight of 70%) and the DAO test (maximum weight 30%).

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

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The learning process that is designed for this subject is based on the following:

- Lectures: theoretical activities conducted by the teacher, so that the theoretical support of the subject is given, highlighting the major issues, structuring them on chapters and/or sections and connecting them to each other.
- Classroom practice work/seminars/workshops: Theoretical discussion activities or practice work preferably performed in the classroom and requiring high student participation
- Lab Practice work: The total group of masterclasses will be divided into several groups according to the number of students enrolled, but never more than 20 students so that smaller groups are formed. CAD-CAE Practical Activities with the relevant software will be made in the Technical Office classroom.
- Individual tutorials: These are made on a one-to-one basis, at the department. They aim to help to solve problems that are the students might have, particularly those which for several reasons cannot attend group tutorials or need more personalized attention. These tutorials may be face-to-face or virtual

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During the masterclasses, the most general and important concepts of engineering drawing are presented by using real

examples, so that students can identify similar factors in the exercises performed during the course.

The learning process for this course was designed based on the encouragement of the students' continual work, applying the theoretical contents in practical exercises and projects, which are completed individually or in groups, during the practical lessons.

4.2.Learning tasks

The course includes the following learning tasks:

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The program that the students are offered to help them achieve the expected results involves the following activities which involve the active participation of the students, so that, to achieve the learning outcomes (Considering the experimental level is high, which means a 2h a week for Theory, 2h for practice work and 6 for other activities), no redundancy intended with the above mentioned, the following activities will be developed

- Lectures (Classroom 30h): The concepts and procedures of the subject will be developed and practical examples as support will be developed. Also, problems and case studies will be done to complement the theoretical concepts studied
- Laboratory practice work (30h): Students will be divided into several groups not bigger than 20 students / being monitored by the teacher and they will develop the concepts and procedures in CAD-CAE
- Tutorials: Monitored autonomous activities: Although they will rather have a mixed nature between face-to-face and non-class tuition they have been considered separately and will be focused mainly to seminars and tutorials under the supervision of the teacher.
- Personal Study: Assimilation of the concepts and procedures for a proper learning process
- Assessment test: Individual test where the student shows his level of understanding and competence on the subject.

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1. Masterclasses (20 h): classroom sessions where the theoretical concepts are exposed and explained to the students.

2. Practical classes (20 h): classroom sessions where the contents learned during the masterclasses are applied.

3. Computer lab sessions (20 h): in-class sessions with required attendance. During these sessions, with the help of a computer, the student learns to use parametric software to model in 3D.

4. Group or independent work (85 h): the part of the course where the student should assimilate the knowledge explained and worked during the sessions with required attendance through their autonomous study.

During the semester, they are faced with:

- Tasks related to each of the topics explained and subsequent correction of some of them in class.
- Modeling of a CAD assembly: parts, assembly and planes.

5. Assessment (7 h): evaluation of the entire course curriculum (attendance required).

- Theoretical and practical exam (5 h).
- CAD Exam (2 h). Management of the software and application to the course.

Theory hours					
Required attendance hours				Non- required attendance hours	Total
Master classes	Practical classes	Computer lab sessions	Evaluation	Group or independent work	
20	20	20	7	83	150

4.3.Syllabus

The course will address the following topics:

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Essential Contents of the subject for the achievement of learning outcomes

1 Technical Drawing and Representation Systems

1-1.- Geometric Plotting. Basic standardization.

- Sketching
- Dimension Drawing
- Views and Sections

- Thread Representation
- Cone-shaping, Convergence, Tilt or Pending

1-2.- Industrial Technical Drawing. Advanced Standards

- Detachable and Fixed Joint
- Tolerances. Fundamental concepts
- Gearwheels
- Bearings

2 Knowledge and application of CAD / CAE Tools

2.1: Knowledge and Applications in the development of CAD / CAE (I).

- Introduction to the Modeling Process
- Working with Sketches
- Introduction to Operations
- Assemblies (Sets, Groups or Functional Units)
- Documentation
- Presentation -Exploding-

2.2 Knowledge and Application in the Development of CAD-CAE (II)

- Scheme Development Software

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- TOPIC 0.- Basic concepts of metric geometry
    - 0.1. Fundamental graphic drawings
    - 0.2. Fundamental constructions
    - 0.3. Figures and geometric shapes
- TOPIC 1.- Engineering drawing standards
    - 1.1. Scales
    - 1.2. Formats
    - 1.3. Type of lines
    - 1.4. Lettering
- TOPIC 2.- Descriptive Geometry: Orthographic projection, dimensioning and cuts
    - 2.1. Basics of the orthographic projection
    - 2.2. Orthographic views
    - 2.3. Dimensioning
    - 2.4. Sections
- TOPIC 3. Axonometric projection
    - 3.1. Isometric projection
    - 3.2. Oblique projection
- TOPIC 4.- Topographic system
    - 4.1. Basics of topography
    - 4.2. Sitework
    - 4.3. Topographic profiles
- TOPIC 5. Assemblies and parts
    - 5.1. Assembly drawing
    - 5.2. Exploded drawing
    - 5.3. Standard features
- Computer-Aided-Design (CAD)
    - 1. Basic modeling of parts. Sketch and basic operations
    - 2. Drawings
    - 3. Assembly of parts
    - 4. Advanced options of representation

4.4.Course planning and calendar

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The Theory and Problem-Solving Lectures and the practical sessions in the laboratory are given according to the schedule

set up by the School and it is published, prior to the start date of the course, on the EUPLA website, as well as the tutorial schedule.

The most significant dates -Planning of the Subject- (initial test, work proposals, and presentations and evaluation test) will be explained in the classroom, at the beginning of the course and in the Moodle Virtual Classroom.

The weekly schedule of the subject will be published at http://www.eupla.unizar.es/asuntos-academicos/calendario-y-horarios.

The dates of the global evaluation test (official calls) will be published at
http://www.eupla.unizar.es/asuntos-academicos/examenes

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The most important dates will be announced in class at the beginning of the course. The weekly schedule of the course and the dates of the final global exam (official call) will be officially published on the CUD website.

Week	*Topic*	*Type 1 (Masster class.)*	*Type 2 (Practical classes)*	*Type 3 (Lab.)*	*Type 7 (Independent work)*	*Type 8 (Eval)*	*Workload*
1	Standards	2	2		3		4,7%
2	Descriptive geometry	2	2		4		5,3%
3	Descriptive geometry	2	2		4		5,3%
4	Descriptive geometry	2	2		6		6,7%
5	Axonometric projection	2	2		8		8,0%
6	Midterm exam (B1)					2	1,3%
7	Topographic system	2	2		6		6,7%
8	Topographic system	2	2		6		6,7%
9	Topographic system	2	2		6		6,7%
10	CAD			4	4		5,3%
11	CAD			4	4		5,3%
12	CAD			4	4		5,3%
13	Assemblies and parts	2	2		4		5,3%
14	CAD			4	8		8,0%
15	CAD			4	8		8,0%
16	Refresher class	2	2		8		8,0%
17	Exams					5	3,3%
	Total	20	20	20	83	7	150

4.5.Bibliography and recommended resources

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RESOURCES:

- Access to the subject documentation using the Moodle platform
- Freehand drawing tools and pendrive

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BIBLIOGRAPHY

http://biblos.unizar.es/br/br_citas.php?codigo=30103&year=2019

RESOURCES

· Classroom materials, lecture notes and learning materials are available via Moodle