Universidad Zaragoza

Academic Year/course: 2022/23

30103 - Graphic expression and computer-assisted design

Syllabus Information

Academic Year: 2022/23
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: 425 - Bachelor's Degree in Industrial Organisational Engineering
563 - 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.

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These approaches and objectives are in line with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/), in such a way that the acquisition of the course learning outcomes provides training and competence to contribute to their achievement to some degree

Goal 4: Quality Education

4.3 Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.4 Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

Goal 5: Gender Equality

5.1 End all forms of discrimination against all women and girls everywhere

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.

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This course will provide future Army Officers tools that will allow a better understanding of the geometry and operation of the daily elements, of the technical documents and maps used, as well as the distribution of the spaces within their future professional environment. This will facilitate the proper development of their daily tasks and will contribute to the success of the assigned missions

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 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.

2.3. Importance of 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.

3. Assessment (1st and 2nd call)

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

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CONTINUOUS ASSESSMENT.

Participation (20%): Activities and work posed in class; Attitude and direct observation of skills and abilities in the subject.

Individual / Group Work -CAD-CAE- (40%): Posed work

Assessment test (40%): Test of practical application of concepts and procedures.

All the sections will have a summative value as long as the lowest mark in each one is 4

Students who have not passed any of the sections in the continuous assessment must go in for the respective calls of that part not passed or, where appropriate, make suitable corrections.

FINAL ASSESSMENT GLOBAL TEST

The student must opt ??for this modality when, due to their personal situation, they cannot adapt to the learning-teaching pace required in the continuous assessment system, they have failed their or they would like to improve their grade having participated in that assessment system.

Individual Work -CAD-CAE- (50%): Posed work

Assessment test (50%): Test of practical application of concepts and procedures.

All the sections will have a sum value as long as the value in each one is> 4

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Final Grade of the course will be calculated according to the following formula:

Final Grade = 0,7 · Theorical-Practical Grade + 0,3 · CAD Grade

To pass the subject, the student?s Final Grade must be equal to or higher than 5. To make the calculation, both Theorical-Practical Grade and CAD Grade must be equal to or higher than 5. Otherwise, the lowest grade will be published.

Both Theorical-Practical Grade and CAD Grade could be independently obtained, by continuous assessment or by first and second call, and will be kept until the end of the academic year.

FIRST CALL

a) Continuous assessment

The students will be able to pass the total of the subject by the continuous assessment procedure. To do this, they must demonstrate that they have achieved the expected learning outcomes by passing the assessment instruments indicated below, which will be carried out throughout the semester.

The Theorical-Practical Grade through continuous assessment will be obtained from the grade of two assessment tests. It will be calculated according to the following formula A minimum grade in any of them is required:

Theorical-Practical Grade = 0,6 · Assessment test 1 Grade + 0,4 · Assessment test 2 Grade

Where,

1. Assessment test 1 will consist in a midterm exam of Topics 1, 2 and 3 where it will be necessary to draw by hand and interpret information in Dihedral and Axonometric Systems. In addition, it may include some brief theoretical-practical questions related to normalization and/or these representation systems. Its specific weight will be 60% of Theoretical-Practical Grade (42% of Final Grade).
2. Assessment test 2 will consist in a midterm exam of Topic 4 where it will be necessary to draw by hand and interpret information in Topographic System. In addition, it may include some brief theoretical-practical question related to this representation system. Its specific weight will be 40% of Theoretical-Practical Grade (28% of Final Grade).

In addition, CAD Grade through continuous assessment will be given by the CAD Test Grade.

1. CAD Test will consist in an exam where it will be necessary to show the handling and dexterity with the modelling, assembly and drawing tools in SolidWorks. It will be carried out in digital format in the computer room and will be submited through Moodle. Its specific weight will be 30% of Final Grade.

b) Final Exam

The students who do not pass the subject by continuous assessment or who would like to improve their grades, will have the right to take the Final Exam set in the academic calendar, prevailing, in any case, the best of both grades. This global assessment will evaluate the same learning goals as the continuous assessment exams and will be divided into the two parts of the Final Grade.

Theorical-Practical Grade of Final Exam will be given by the Theorical-Practical Assessment 1 Grade.

1. Theorical-Practical Assessment 1will consist in a final exam of Topics 1, 2, 3 and 4 where it will be necessary to draw by hand and interpret information in Dihedral, Axonometric and Topographic Systems. In addition, it may include some brief theoretical-practical questions related to normalization and/or these representation systems. Its specific weight will be 70% of Final Grade.

In addition, CAD Grade will be given by the CAD Test 1 Grade.

1. CAD Test 1 will consist in an exam where it will be necessary to show the handling and dexterity with the modelling, assembly and drawing tools in SolidWorks, equivalent to continuous assessment. It will also be carried out in digital format in the computer room and will be submitted through Moodle. Its specific weight will be 30% of Final Grade.

SECOND CALL

The students who do not pass the subject in the first call may take the Final Exam set in the academic calendar for the second call. This global assessment will evaluated the same learning goals as the first call exams and will also be divided into the two parts of the Final Grade.

Theorical-Practical Grade of Final Exam will be given by the Theorical-Practical Assessment 2 Grade.

1. Theorical-Practical Assessment 2 will consist in a final exam of Topics 1, 2, 3 and 4, equivalent to Theorical-Practical Assessment 1. Its specific weight will be 70% of Final Grade.

In addition, CAD Grade will be given by the CAD Test 2 Grade.

1. CAD Test 1 will consist in an exam where it will be necessary to show the handling and dexterity with the modelling, assembly and drawing tools in SolidWorks, equivalent to CAD Test 1. Its specific weight will be 30% of Final Grade.

ASSESSMENT CRITERIA

The Theoretical and Practical Assessments evaluate in a general way: the precision and cleanliness in the layout; the dimensioning and scaling of the elements; the adequate representation according to representation systems; and the knowledge and application of current regulations.

The DAO tests evaluate in a general way: the adequate definition of the geometries and dimensions in the modelling; the handling of the modelling and assembly tools; the use of normalized elements; and the correct execution of drawings applying current standards.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

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The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

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.

The approach, methodology and assessment of this course is prepared to be equivalent in any teaching scenario. It will be adjusted to the socio-sanitary conditions of each moment, as well as to the indications given by the competent authorities.

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 (81 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 (9 h): evaluation of the entire course curriculum (attendance required).

- Theoretical and practical exam (6 h).
- CAD Exam (3 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	9	81	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
- Computer-Aided-Design (CAD)
  - 1. Basic modeling of parts: Sketch and basic operations
  - 2. Assemby of parts: Asseblies and standard components
  - 3. Exploded drawing and assembly drawing
  - 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 (Master)*	*Type 2 (Pract.)*	*Type 3 (Lab)*	*Type 7 (Indep. work)*	*Type 8 (Eval)*	*Workload*
1	Standards	2	2		3		4,7%
2	Descriptive geometry	3	3		7		8,6%
3	Descriptive geometry	3	3		7		8,6%
4	Axonometric projection	2	2		8		8,0%
5	Midterm exam 1					2	1,3%
6	CAD			6	6		8,0%
7	CAD			6	6		8,0%
8	CAD:	2	2		4		5,3%

	Assemblies						
9	CAD			4	8		8,0%
10	CAD			4	8		8,0%
11	Topographic system	3	3		9		10%
12	Topographic system	3	3		9		10%
13	Refresher class	2	2		6		6,6%
14	Midterm exam 2					2	1,3%
15	Exam					5	3,3%
	Total	20	20	20	81	9	150 (100%)

4.5. Bibliography and recommended resources

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RESOURCES:

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

BIBLIOGRAPHY

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=30103

SPECIALIZATION IN DEFENCE

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RESOURCES

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