Engineering Graphics

Academic Year: (2023 / 2024) **Review date: 08/01/2024 11:58:52**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: VIADERO MONASTERIO, FERNANDO

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Students are expected to have completed Technical Drawing in the High School.

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG10. Being able to work in a multi-lingual and multidisciplinary environment
CE5 Módulo FB. Ability for spatial vision and knowledge of graphic representation techniques, including traditional methods of metric geometry and descriptive geometry as well as computer assisted design applications.
CT1. Ability to communicate knowledge orally as well as in writing to a specialized and non-specialized public.
CT2. Ability to establish good interpersonal communication and to work in multidisciplinary and international teams.
CT3. Ability to organize and plan work, making appropriate decisions based on available information, gathering and interpreting relevant data to make sound judgement within the study area.
CT4. Motivation and ability to commit to lifelong autonomous learning to enable graduates to adapt to any new situation.

By the end of this content area, students will be able to have:
RA1.1 knowledge and understanding of representation systems, their geometric basis, normalized agreements and symbols about industrial design and computer-aided design.
RA2.1 the ability to apply their knowledge and understanding to read, interpret and perform Industrial drawings.
RA3.2 an understanding of design methodologies to express graphical ideas, designs and projects in a precise and normalized way.
RA4.3 workshop and laboratory skills.
RA5.1 the ability to select and use appropriate tools and methods to perform industrial designs.
RA5.2 the ability to combine theory and practice to solve engineering problems.

OBJECTIVES

Upon successful completion of this subject, students will be able to:
1. Know, interpret and use the representation systems, their geometric foundation and the

conventions and standardized symbols that underlie industrial design and computer-aided design.
2. Apply your knowledge and understanding to read, interpret and correctly develop industrial drafts.
3. Understand and use different methods to graphically express ideas, designs and projects in a precise, clear, unambiguous and standardized manner.
4. Develop technical level and computer-aided design laboratory tasks.
5. Select and use appropriate tools and methods to graphically document industrial designs.
6. Combine theory and practice to solve problems of engineering graphics.
7. Work effectively both individually and as a team.

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Normalized representation systems:
1.1.- Descriptive Geometry (Ortographic Projection)
1.2.- Axonometric system
2.-Normalized representation of basic industrial elements.
2.1. - Industrial drawing rules.
2.2.- Axiliary views, cross sections.
2.3.- Assembly and part drawings.
2.4.- Dimensioning rules.
2.5.- Dimensional and geometrical tolerances, and fittings.
3.-Computed assisted design
3.1.- Modelling
3.2.- Assembly
3.3.- Drafts

LEARNING ACTIVITIES AND METHODOLOGY

Theoretical presentations in master classes
Drawing exercises
Computer exercises by CAD software
Personal and group working
Realization of drafts
Group work to design assemblies

ASSESSMENT SYSTEM

% end-of-term-examination/test:	49
% of continuous assessment (assigments, laboratory, practicals…):	51

Assessment system:

- Continuous assessment: 51%
- End-of-term-examination: 49%

The subject will be evaluated according to the following criteria:

- Continuous evaluation of the first part of the subject (CE1): Up to 0,45 points
- Continuous evaluation of the second part of the subject (CE2): Up to 0,75 points
- Continuous evaluation of the third part of the subject (CE3): Up to 0,9 points
- Class work (CW): Up to 3 points

- Final exam, composed by three parts:
    - Final exam of the first part of the subject (FE1): Up to 1,05 points
    - Final exam of the second part of the subject (FE2): Up to 1,75 points
    - Final exam of the third part of the subject (FE3): Up to 2,1 points

If any part of the continuous evaluation is passed, the attendance to the exam of that corresponding passed part of the subject is released. In such a case (all grades are out of 10 points):

- If the student passes the three parts of the continuous evaluation (that is, CE1 greater than or equal to 5, CE2 greater than or equal to 5 and CE3 greater than or equal to 5), the student will not attend the final exam, and her/his final grade will be calculated as:

% end-of-term-examination/test:	49
% of continuous assessment (assigments, laboratory, practicals…):	51

FINAL GRADE= 0,3 * CW + 0,15 * CE1 + 0,25 * CE2 + 0,3 * CE3

- If the student does not pass some of the parts of the continuous evaluation, the student will attend those failed parts in the final exam, and her/his final grade will be calculated according to the following equations:

- If CE1>=5; CE2<5; CE3<5: FINAL GRADE= 0,3*CW+0,15*CE1+0,075*CE2+0,175*FE2+0,09*CE3+0,21*FE3

- If CE1>=5; CE2>=5; CE3<5: FINAL GRADE= 0,3*CW+0,15*CE1+0,25*CE2+0,09*CE3+0,21*FE3

- If CE1>=5; CE2<5; CE3>=5: FINAL GRADE= 0,3*CW+0,15*CE1+0,075*CE2+0,175*FE2+0,3*CE3

- If CE1<5; CE2>=5; CE3<5: FINAL GRADE= 0,3*CW+0,045*CE1+0,105*FE1+0,25*CE2+0,09*CE3+0,21*FE3

- If CE1<5; CE2<5; CE3>=5: FINAL GRADE= 0,3*CW+0,045*CE1+0,105*FE1+0,075*CE2+0,175*FE2+0.3*CE3

- If CE1<5; CE2>=5; CE3>=5: FINAL GRADE= 0,3*CW+0,045*CE1+0,105*FE1+0,25*CE2+0,3*CE3

- If CE1<5; CE2<5; CE3<5: FINAL GRADE=0,3*CW+0,045*CE1+0,105*FE1+0,075*CE2+0,175*FE2+0,09*CE3+0,21*FE3

Below are the items with the grading percentages:

Continuous assessment:

- CW: Course work, exercises delivered, exercises in the computer room, etc.: 30%
- CE1: Partial exam part 1. 4,5%, if it is failed. 15% if it is passed (FE1 exempt in Ord. Call)
- CE2: Partial exam part 2. 7,5%, if it is failed. 25% if it is passed (FE2 exempt in Ord. Call)
- CE3: Partial exam part 3. 9%, if it is failed. 30% if it is passed (FE3 exempt in Ord. Call)

To pass in the ordinary call, it will be necessary to obtain a total grade (considering the partial exams and the rest of the continuous evaluation) greater than or equal to 5 and obtain a grade greater than or equal to 3,5 out of 10 in the computer-aided design (CAD) part.

Final exam:

- FE1: Final exam part 1. 10,5%. Exempt (in Ord. Call) if CE1 is passed.
- FE2: Final exam part 2. 17,5%. Exempt (in Ord. Call) if CE2 is passed.
- FE3: Final exam part 3. 21%. Exempt (in Ord. Call) if CE3 is passed.

The student must obtain at least 35% of the grade of each part of the exam to pass the subject.

In the case of the extraordinary call, the student will take the exam with the complete agenda of the subject. However, the following criteria will be considered to calculate the grade:

- If the student followed the continuous evaluation process, the exam will have the same percentage value as in the ordinary call. Then, the final grade for the subject will consider the mark of the continuous evaluation and the mark obtained in the final exam.
- If the student did not follow the continuous evaluation process, the student will have the right to take an exam in the extraordinary call with a value of 100% of the final grade of the subject.
- Although the student had followed the continuous evaluation process, the student will have the right to be graded in the extraordinary call considering only the final exam grade when this option is more favourable to him.

In other words, in the extraordinary call, no part is exempt. And the grading will be the most beneficial among the cases:
i) 100% of the exam, or
ii) 10,5%, 17,5% and 21% of FE1, FE2 and FE3 respectively, plus 4,5%, 7,5% and 9% of partial exams

% end-of-term-examination/test:	49
% of continuous assessment (assigments, laboratory, practicals…):	51

CE1, CE2 and CE3 respectively, plus 30% of CW. In order to qualify for the ii) formula, a minimum of 35% in the exam must be obtained to pass the subject.

BASIC BIBLIOGRAPHY

- Basant Agrawal, C.M. Agrawal Engineering Drawing, McGraw-Hill, 2013

- J. Félez y M. L. Martínez Dibujo industrial, Síntesis.

- Meneses, Álvarez, Rodríguez Introducción al Solid Edge, Paraninfo.

- Sham Tickoo Solid Edge V19 for Designers, Purdue University Calumet, USA, 2006

ADDITIONAL BIBLIOGRAPHY

- B. Ramos Barbero y E. García Maté Dibujo Técnico, AENOR.

- C. Preciado y F.J. Moral Normalización del dibujo técnico, Ed. Donostiarra.

- F. J. Rodríguez de Abajo y R. Galarraga Normalización del dibujo industrial, Ed. Donostiarra, 1993

- Izquierdo Asensi Geometría Descriptiva, Autor.

- Varios autores Normas UNE, UNE.