



1. General information

Course: ENGINEERING GRAPHICS I

Type: BASIC

Degree: 352 - UNDERGRADUATE DEGREE PROGRAMME IN MECHANICAL ENGINEERING (AB)

Center: 605 - SCHOOL OF INDUSTRIAL ENGINEERS. AB

Year: 1

Main language: Spanish

Use of additional languages:

Web site:

Code: 56305

ECTS credits: 6

Academic year: 2021-22

Group(s): 14 15 16

Duration: C2

Second language: English

English Friendly: Y

Bilingual: N

Lecturer: JOSE VICENTE ATIENZAR FUENTES - Group(s): 16				
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Lecturer: MIGUEL CASTRO GARCIA - Group(s): 14				
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ETSII-AB/0.B.13. ETSIAMB/Primera planta. IER/Laboratorio de Impresión 3D	MECÁNICA ADA. E ING. PROYECTOS	926053507	miguel.castro@uclm.es	
Lecturer: MARIA DE LAS NIEVES SANCHEZ CASADO - Group(s): 15				
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2. Pre-Requisites

It is necessary that the students have skills to use the drawing tools and some previous knowledge as following:

- Basic concepts of geometry and trigonometry.
- Basic skills in 3D-space perception.
- Basic skills the technical tools: drawing tools and computer skills.

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

This subject belongs to the basic learning in the Degree framework. The learning competences which are expected can be summarize in: 1) vision and resolution of 3D-problems, 2) reading and interpretation of pieces plans, 3) appropriate apply of the standardization in technical drawings.

The concepts deal in this subject will be used in next others mandatory subjects in this Degree which are common to the Industrial branch like Technical Drawing II, CAD Techniques, Engineering Projects, among others.

4. Degree competences achieved in this course

Course competences

Code	Description
A01	To understand and have knowledge in an area of study that moves on from the general education attained at secondary level and usually found at a level that, while supported in advanced text books, also includes some aspects that include knowledge found at the cutting edge of the field of study.
A02	To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study.
A07	Knowledge of Information Technology and Communication (ITC).
A12	Knowledge of basic materials and technologies that assist the learning of new methods and theories and enable versatility to adapt to new situations.
A13	Ability to take the initiative to solve problems, take decisions, creativity, critical reasoning and ability to communicate and transmit knowledge, skills and abilities in Mechanical Engineering.
A15	Ability to work to specifications and comply with obligatory rules and regulations.
B05	Spatial awareness and knowledge of graphical representation techniques, both through traditional geometrical measurements and descriptive geometry, as well as through the application of computer assisted design.
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

5. Objectives or Learning Outcomes

Course learning outcomes

Description

6. Units / Contents

Unit 1: Basic geometric drawing

- Unit 1.1 Tools for technical drawings
- Unit 1.2 Basic technical drawing in a plane
- Unit 1.3 Polygonal constructions
- Unit 1.4 Geometrical relationships
- Unit 1.5 Proportionality of graphical constructions
- Unit 1.6 Scale
- Unit 1.7 Tangencies and connections
- Unit 1.8 Plane curves
- Unit 1.9 Fundamentals of conical and technical curves. Geometrical transformations

Unit 2: Descriptive geometry. Representation systems

- Unit 2.1 Descriptive geometry as representation science
- Unit 2.2 Projections
- Unit 2.3 Representation systems: Gaspard Monge's descriptive geometry, contour maps, axonometric systems and conical system
- Unit 2.4 Fundamentals of representation systems

Unit 3: Orthogonal representation

- Unit 3.1 Fundamentals of orthogonal representation
- Unit 3.2 Basic shapes
- Unit 3.3 Intersections. Relative locations of a straight line and planes. Distances
- Unit 3.4 Descriptive geometric procedures: Auxiliary views, change of projection planes and spin
- Unit 3.5 Shape constructions.
- Unit 3.6 Regular polyhedron, radial surfaces and spherical surface.
- Unit 3.7 Intersections

Unit 4: Contour map system

- Unit 4.1 Fundamentals
- Unit 4.2 Basic representations
- Unit 4.3 Intersections
- Unit 4.4 Auxiliary views
- Unit 4.5 Engineering uses: Roof resolutions and topographical surfaces

Unit 5: Introduction to the Industrial technical drawing

- Unit 5.1 Standardization
- Unit 5.2 Typology of the standards
- Unit 5.3 Basic stands for technical drawing: Piece of papers, scale, plan box and plan folded

Unit 6: Standardization of pieces

- Unit 6.1 General principles
- Unit 6.2 Projection methods
- Unit 6.3 Auxiliary views
- Unit 6.4 Regular views
- Unit 6.5 Cut and section
- Unit 6.6 Annotation: general issues, methodologies and levels
- Unit 6.7 Assembly drawing

Unit 7: Axonometric systems

- Unit 7.1 Orthogonal axonometric system: isometric, dimetric and trimetric
- Unit 7.2 Oblique axonometric system
- Unit 7.3 Graphical scale
- Unit 7.4 Shapes in planes and geometrical bodies
- Unit 7.5 Axonometric representation of industrial pieces

Unit 8: Computer-Aided Drawing (CAD)

- Unit 8.1 CAD interface
- Unit 8.2 Basic commands
- Unit 8.3 Object properties
- Unit 8.4 Isometrically drawing
- Unit 8.5 Blocks

Unit 9: CAD applications

- Unit 9.1 2D drawing
- Unit 9.2 Facilities plans
- Unit 9.3 Plan printing

ADDITIONAL COMMENTS, REMARKS

This subject has 3 blocks:

Block 1. Representation systems (Lessons: 1, 2, 3, 4 and 7)

Block 2. Basic standardized representations (Lessons: 5 and 6)

7. Activities, Units/Modules and Methodology							
Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	A01 A02 A07 A12 CB01 CB02 D01	0.6	15	N	-	Presencial lectures.
Class Attendance (practical) [ON-SITE]	Problem solving and exercises	A12 A13 A15 CB03 CB04 CB05 D01	0.8	20	Y	N	Presencial activities with technical drawing tools.
Computer room practice [ON-SITE]	Problem solving and exercises	A13 A15 B05 CB03 CB04 CB05 D01	0.6	15	Y	Y	CAD software.
Writing of reports or projects [OFF-SITE]	Self-study	A13 A15 B05 CB03 CB04 CB05 D01	0.6	15	Y	N	Resolution of exercises.
Writing of reports or projects [OFF-SITE]	Self-study	A13 A15 B05 CB03 CB04 CB05 D01	1	25	Y	N	Self-learning with CAD software.
Study and Exam Preparation [OFF-SITE]	Self-study	A01 A02 A07 A12 A13 A15 B05 CB01 CB02 CB03 CB04 CB05	2	50	N	-	Personal study and reference searching.
Individual tutoring sessions [ON-SITE]	Other Methodologies	A01 A02 A12 A13 A15 B05 CB01 CB02 CB03 CB04 CB05 D01	0.2	5	N	-	Individualized monitoring of training activities and the learning process.
Final test [ON-SITE]	Assessment tests	A01 A02 A07 A12 A13 A15 B05 CB01 CB02 CB03 CB04 CB05 D01	0.2	5	Y	Y	Assessment tests of the subject: Progress and Final.
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
Assessment of problem solving and/or case studies	5.00%	0.00%	The works of board on Standardisation realised in the classroom will be valued.
Assessment of problem solving and/or case studies	5.00%	0.00%	The works carried out on Standardisation by the student will be assessed.
Progress Tests	10.00%	0.00%	Evaluation of the competences acquired through a test in the equator of the subject.
Final test	60.00%	70.00%	Evaluation of the competences acquired through a final global test of the subject.
Assessment of activities done in the computer labs	5.00%	30.00%	The works of board on Standardisation realised in the classroom will be valued.
Assessment of problem solving and/or case studies	15.00%	0.00%	The works carried out on descriptive geometry by the student will be assessed.
Total:	100.00%	100.00%	

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:**

The grade of the final test will be assessed with a maximum of 6 points, adding to it the score obtained by the different activities carried out during the course depending on their specific weight. The subject will be passed if the overall score of the sum of the different activities is equal to or greater than 5 points.

The student must overcome the compulsory activities. If block 3 is not approved in the continuous evaluation, the student must submit to a face-to-face test with a date subsequent to the final test.

If these criteria are not met, it will inevitably entail a global grade of the subject not exceeding 4 points.

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

The subject will be passed if the overall score of the activities programmed in the extraordinary call is equal to or greater than 5 points.

If block 3 is not approved in the continuous evaluation, the student must submit to a face-to-face test with a date subsequent to the final test.

If these criteria are not met, it will inevitably entail a global grade of the subject not exceeding 4 points.

Those grades of the ordinary evaluation equal or superior to 5 points of the global of block 1 or of block 2 will be conserved in this call, exempting the student from attending the activities programmed for these blocks.

Specifications for the second resit / retake exam:

The subject will be passed if the overall score of the activities programmed in the special call for completion is equal to or greater than 5 points.

The student must overcome the compulsory activities: Achieve at least 3 points on 10 points in each of blocks 1 and 2. You must also achieve in block 3 a grade equal to or greater than 5 points.

If these criteria are not met, it will inevitably entail a global grade of the subject not exceeding 4 points.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Final test [PRESENCIAL][Assessment tests]	6
Unit 1 (de 9): Basic geometric drawing	
Activities	Hours
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	5
Unit 2 (de 9): Descriptive geometry. Representation systems	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1.5
Unit 3 (de 9): Orthogonal representation	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	7
Writing of reports or projects [AUTÓNOMA][Self-study]	7
Study and Exam Preparation [AUTÓNOMA][Self-study]	10.5
Unit 4 (de 9): Contour map system	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	7
Writing of reports or projects [AUTÓNOMA][Self-study]	7
Study and Exam Preparation [AUTÓNOMA][Self-study]	10.5
Unit 5 (de 9): Introduction to the Industrial technical drawing	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1.5
Unit 6 (de 9): Standardization of pieces	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 7 (de 9): Axonometric systems	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	5
Unit 8 (de 9): Computer-Aided Drawing (CAD)	
Activities	Hours
Computer room practice [PRESENCIAL][Problem solving and exercises]	10
Writing of reports or projects [AUTÓNOMA][Self-study]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Unit 9 (de 9): CAD applications	
Activities	Hours
Computer room practice [PRESENCIAL][Problem solving and exercises]	5
Writing of reports or projects [AUTÓNOMA][Self-study]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	19
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	20
Computer room practice [PRESENCIAL][Problem solving and exercises]	15
Writing of reports or projects [AUTÓNOMA][Self-study]	15
Writing of reports or projects [AUTÓNOMA][Self-study]	25
Study and Exam Preparation [AUTÓNOMA][Self-study]	50
Final test [PRESENCIAL][Assessment tests]	6
Total horas: 150	

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Collado Sánchez-Capuchino, Vicente	Sistema de planos acotados : sus aplicaciones en ingeniería	Tebar Flores		84-7360-087-8	1988	
J. Beltran Guasp	Geometría Descriptiva. Sistema Diedrico Directo	Donostiarra		84-7063-197-7		
J.A. Sanchez Gallego	Geometría Descriptiva	UPC	Barcelona	84-8301-221-9	1977	
Joaquin Gonzalo	Practicas de dibujo Tecnico. Nº 1. Croquizacion	Donostiarra		978-84-7063-305-8		
Joaquin Gonzalo	Practicas de dibujo Tecnico. Nº 14. Sistema Diedrico Directo	Donostiarra		978-84-7063-380-5		
Joaquin Gonzalo	Practicas de dibujo Tecnico. Nº 2. Cortes, Secciones y roturas	Donostiarra		978-84-7063-316-4		
Manuel Matute	Practicas de dibujo Tecnico. Nº 9. Test de Normalizacion	Donostiarra		84-7063-124-1		
R. Villar del Fresno y otros	Normalización del Dibujo Industrial	Sere	Vizcaya	84-404-5065-8	1989	
Rodriguez de Abajo	Geometría Descriptiva. Sistema de Planos Acotados	Donostiarra		84-7063-182-9		
Chacón Muñoz, Jesús Miguel; Sánchez-Reyes Fernández, Javier	Expresión gráfica en ingeniería industrial	Editorial Donostiarra		978-84-7063-476-5	2013	
Rodriguez de Abajo	Curso de dibujo geometrico y de croquizacion	Donostiarra		978-84-7063-173-3		
Victor Alvarez	Practicas de dibujo Tecnico. Nº 4. Perspectiva	Donostiarra		84-7063-124-1		
Cheryl R. Shrock (Autor), Steve Heather (Autor)	Advanced AutoCAD Exercise Workbook 2018			978-0831136161	2017	The Advanced AutoCAD(R) 2018 Exercise Workbook has been helping students, teachers, architects, designers and manufacturers to truly master the software for more than two decades. And now this work is better than ever, with the inclusion of both inch and metric measurements side-by-side. The 2018 version of the software boasts the new feature of being able to import SHX fonts when importing documents into AutoCAD(R). With past versions, you could only import SHX fonts as objects that were included in the PDF, which meant that users could not alter the text in any way. In this 2018 version of the software, the text will be fully editable - the same as TrueType text and fonts. That's a tremendous advantage for architects and designers, who use SHX fonts extensively in their drawings. These new features will be explained and thoroughly illustrated so they can be combined with existing AutoCAD(R) options, and users can maximize the full power of this versatile software. Written by Cheryl Shrock and Steve Heather, two bestselling authors and official Beta Testers of AutoCAD(R) software, this is an invaluable resource for the thousands of students, designers, architects, and manufacturers who are just learning AutoCAD(R), or getting up to speed

						with the latest version of the software.
A. Hidalgo de Caviedes	Dibujo Tecnico Industrial	ETS Ingenieros Industriales UPM	84-600-6516-2	1975		
AENOR	Dibujo técnico. Normas básicas	AENOR	84-8143-271-7	2001		
Alberto Revilla	Practicas de dibujo Tecnico. Nº 3. Acotación	Donsotiarra	978-84-7063-317-1			
Alberto Revilla	Practicas de dibujo Tecnico. Nº 6. Vistas y visualizacion	Donostiarra	84-7063-132-2			
Alvaro González, José Iganacio	Sistema de planos acotados y su aplicación al dibujo topográ	Dossat 2000	84-237-0827-6	1994		
C. Mendez	Practicas de dibujo Tecnico. Nº 11. Sistemas de Planos Acotados	Donostiarra	84-7063-158-6			
Candido Preciados y otro	Normalizacion del Dibujo Tecnico	Donostiarra Navarra	84-7063-309-0	2004		
Colin H. Simmons	Manual of Engineering Drawing: Technical Product Specification and Documentation to British and International Standards		978-0080966526	2012		Now in its 4th edition, Manual of Engineering Drawing is a long-established guide for practicing and student engineers to producing engineering drawings and annotated 3D models that comply with the latest BSI and ISO standards of technical product specifications and documentation. This new edition has been updated in line with recent standard revisions and amendments, including the requirements of BS8888 2011 and related ISO standards. Ideal for international use, it includes a guide to the fundamental differences between the relevant ISO and ASME standards, as well as new information on legal aspects such as patents and copyright, and end-of-life design considerations. Equally applicable to CAD and manual drawing, the book includes the latest developments in 3D annotation and the specification of surface texture. Its broad scope also encompasses topics such as orthographic and pictorial projections, dimensional, geometrical and surface tolerancing, and the duality principle, along with numerous examples of electrical and hydraulic diagrams with symbols and applications of cams, bearings, welding and adhesives. Seen by many as an essential design reference, Manual of Engineering Drawing is an ideal companion for students studying vocational courses in technical product specification, undergraduates studying engineering or product design, and professional engineers beginning a career in design.
						TECHNICAL DRAWING FOR ENGINEERING

David Goetsch (Autor), Raymond
Rickman (Autor), William S. Chalk
(Autor) Technical Drawing for
Engineering Communication

978-1285173016

COMMUNICATION, 7E offers a fresh, modern approach to technical drawing that combines the most current industry standards with up-to-date technologies and software, resulting in a valuable, highly relevant resource you won't want to be without. The book builds on features that made its previous editions so successful: comprehensive coverage of the "total technical drawing experience" that explores both the basic and advanced aspects of engineering and industrial technology and reviews both computer modeling and more traditional methods of technical drawing. Enhancements for the seventh edition include updates based on industry trends and regulations, an all-new chapter on employability skills, and additional content on SolidWorks 3D modeling software for drafting technicians. The end result is a tool that will give you the real-world skills needed for a successful career in CAD, drafting, or design