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300219 - EG - Graphic Expression

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering

Teaching unit: 717 - EGE - Department of Engineering Presentation

Academic year: 2018

Degree: BACHELOR'S DEGREE IN AIR NAVIGATION ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AIRPORT ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERINGS/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING - NETWORK ENGINEERING (AGRUPACIÓ DE SIMULTANEÏTAT) (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)

ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: Definit a la infoweb de l'assignatura.

Others: Definit a la infoweb de l'assignatura.

Opening hours

Timetable: TUESDAY 14,00 - 16,00
WEDNESDAY 8,00 - 10,00
WEDNESDAY 14,00 - 16,00

Prior skills

For the basic character of the course content does not require specific background except those listed below:
-Management of computers and common programs: word processing, spreadsheets, browsers, email, etc.. (OS Windows XP, Windows 7, Mozilla Firefox browsers, Internet Explorer, File Compression, Spreadsheet).
-Ability to search, collect and manipulate information in electronic form.
-Elementary knowledge of basic geometry both graphical and mathematical.
Not require any specific prerequisite is not supposed to have a student who has accessed the EETAC.
As for material resources is essential have a computer with internet access and able to support the proper functioning of the course Software: "Solid Works 2011" and browsers, email, word processors and spreadsheets that can be usually used along the course. Eventually may be required CD or DVD recorder and a printer that supports the format ISO A-3.

Degree competences to which the subject contributes

Transversal:

1. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
2. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the

time needed to complete each task, including personal contributions and expanding on the recommended information sources.
3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
4. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
6. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
7. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
8. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.
9. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

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Teaching methodology

The teaching methodology fit perfectly with the guidelines of the EETAC. Its main features are:

-Experimental. The entire teaching is experimental and therefore in all acts of evaluation, the student may have the information they see fit.

- Project Based Learning. In many of the problems and exercises of the course your solution lies in considering a succession of simple problems that chained and conjugated solving the problem or complex mechanism. In a way, and although not formulated the problem as a formal project, if it contains many features of this type of learning.

-Continuous Evaluation of knowledge. The student evaluation is present in each of the course activities.
The evaluation system aims to enhance the student's progress throughout the course
such that a shaky start or low level, can be overcome by the growing importance of the results of evaluations of the final installment of the course when the student has all the knowledge accumulated in the same. Otherwise isn't a demerit for the student.

The methodology employed is based on the principle that any problem can develop from a single initial hypothesis.
Applying this hypothesis is advanced with respect to initial situation.
The recursive application of this principle we gradually approaches to solving the problem.
The final solution is achieved by the accumulation of partial solutions elementary sorted by the own strategy of the problem.
Thereby outline and classify the difficulties, isolate and combine the hypothesis helping overcome them, and are essential in solving the problem.

Identify the precise and concrete problems is the most important to find a solution and, that, is what is to educate and train the student.
Do not ask what should I do? (default activity in which the reason does not intervene but only the previously established and memorized script). the students should ask: What problem I try to solve?, (problem we seek to apply the reasoning and situation specific and not due to a previously established script)

The ultimate aim is to educate in the graphical representation and management concepts, rules and practices which are peculiar to the student's ability to reach and capability to perform and interpret projects and drawings.

By focusing on the practical the method and purpose are rejected, explicitly, the accumulation of data in memory demanding, however, the ability to combine knowledge.

The explanations on the operation of the Computer Aided Design (CAD programs) used are considered merely instrumental help, however, require the adequate students knowledge of the principles and characteristics of the goods and the strategies used.

Learning objectives of the subject

To overcome the subject of Graphic Expression, the student must be able to:
· ¿ Define the standard representation of a solid respecting and using the proper rules and symbols.
· ¿ Interpret and apply the symbols used in the representation of parts, components, assemblies, mechanisms and kinematic patterns.
· ¿ Define a coherent strategy for modeling a solid from its standard representation.
· ¿ Define the characteristics of the rods and joints according to their kinematic scheme and the mechanism to which they belong.
· ¿ Designing basic joints.
· ¿ Use an advanced CAD program for practice, develop and apply concepts and skills.

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· ¿ Interpret and execute topographic's drawings.
· ¿ Adapt the representation of land to the needs of a project that needs to change its shape.
· ¿ Determine profiles, terraced, clearing, embankments and represent them in the corresponding drawings.

Study load

Total learning time: 150h	Hours large group:	0h	0.00%
	Hours medium group:	0h	0.00%
	Hours small group:	52h	34.67%
	Guided activities:	14h	9.33%
	Self study:	84h	56.00%

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Content

TECHNICAL DRAWINGS. General principles of representation. Dimension. Key symbols. (ENG) DIBUJOS TÉCNICOS. Principios generales de Representación. Acotación. Simbología fundamental.

Learning time: 14h

Laboratory classes: 4h
Guided activities: 1h 30m
Self study : 8h 30m

Description:
Knowledge of the rules and fundamental principles of representation of parts and assemblies.
It has two basic components: knowledge and application of the rules (80%) and the representation systems (Orthographic projections) (20%).
There are two ways of learning and use: A: correctly represent a given object and B: starting from the representation of an object to understand their volume and shape in order to model it, optimize it, change your function or adapt to a new situation in other mechanism
That is, as engineers and not only draughtsmen, act and analyzed to optimize solids, changed or adapted wholly or partially their shapes and volumes to a particular feature or function.

Related activities:
The Directed Activity in this content is basically to achieve proficiency in reading technics drawings.
To the students being asked to do a job of collecting relevant errors that can be observed in the referenced bibliography or similar books, papers, patents or treated that they represent such errors and, while, proposing a solution to correct error observed.

Specific objectives:
Knowledge of the standard graphical representation.
Deductions techniques that are extracted from this representation.
Definition of work strategies based on the characteristics of the object / s represented.

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SOLID MODELING: Simple operations including those specific modeling of machining operations (drilling, holes, nerves, casts, braces, etc. ..)	Learning time: 23h Laboratory classes: 10h Self study : 13h

Description:
Solid modeling is performed by a computer-aided design (CAD) of advanced features. Is equivalent to produce a solid of the theoretical model.
The student has to internalize the concept of "strategy" as the optimized set of operations that result in the solid. But for the correct strategy, operations, must be ordered and do simple editing, understanding and correction even by someone outside the designed piece.
It is understood that not all processes or strategies are equally correct.
The most successful strategy is the one that best reflects the "design philosophy and intentions" of the piece.
As students do not have technological know, the criteria must be to logically group operations with emphasis on those concepts and principles that do not have deep technology base:
- Creation of sketches properly defined so that editing is possible and easy
- No repeat operations unjustifiably
- Optimizing the results of operations,
- Do not use empties extrusion when one wants to make a hole (prevents the normalization of it)
- Use constant repetition operations whenever possible.
- To respect the symmetry operations when this is relevant

Related activities:
We propose a set of exercises numerous and of increasing difficulty. The student will choose which performs. The level of difficulty and the number of exercises the student will choose freely. This is essential so that each set and be aware of their knowledge and expertise gained.
Students should explain the criteria used to decide on the use of their strategies and are corrected or highlights about your mistakes.
It is therefore vital to conduct a significant number of these practices in class and recorded in the file for each student what could be crucial to understand and value their work and possible errors.

Specific objectives:
Building a relationship between the operations of software and manufacturing operations and machining of parts.
Optimize the performance and strategies. make the design process and effective first real test on the adequacy of the same.
Optimize the performance and strategies, making, the design process, the first effective real test of the suitability and adequacy of the same.
Knowledge of the types of holes / drills, nerves, shells, lace, etc.. That can be taken and its corresponding implementation process.
Must fit the level of claims to knowledge technologic and manufacturing processes of students is low given academic history and content of the courses taken.

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ADVANCED SOLID MODELING: Work in Multi-solids environment and use of advanced features and complex operations.

Learning time: 23h

Laboratory classes: 10h
Self study : 13h

Description:
Work and design various solids simultaneously.
To what is stated in item 2 should be added the need to relate and identify the solids characteristics, their design details and their relations in order to achieve the better common work in the mechanism.
Basically involves acquire new skills and assume that the strategy should be defined from the mechanism set and not from the "solid" individually considered.
Students acquire the skills necessary for working with assemblies and mechanisms.

Related activities:
The activities are, basically, the same type as those described in the content 2.

Specific objectives:
For the purposes of section 2, and as a generalization of these, must be added the knowledge of the linkages between different parts and their real functioning beyond the theory of joint understanding that the shape is what determines the real behavior of the joints and ultimately set the degrees of freedom of a joint.
Establish a direct relationship between the claims of the designer and the form taken by the parts and their union.

KINEMATICS SCHEMES: Knowledge and application of standard symbols.

Learning time: 11h

Laboratory classes: 4h
Guided activities: 1h 30m
Self study : 5h 30m

Description:
Knowledge of the rules and essential principles of representation of kinematic patterns.
Understanding the relationship between the form of solids and their kinematics roles.
Understand trajectory, limits and movement characteristics of the elements of a mechanism.
not intended to study or to experience a complete and accurate theory of the mechanisms but provide students with basic knowledge and necessary to address the basic design of mechanisms and the interpretation of schemes that express the problems to solve.

Related activities:
Directed Activity in this content is basically that every student will choose the kinematic scheme of aeronautical mechanism (the subject may be free or focusing on a specific topic: Landing gear, flaps, rudders, etc..) And to analyze and properly dimensioned make a working model of it and simulate your functionality.

Specific objectives:
Getting them to appreciate the mechanisms as real and concrete forms and materialized in specific parts whose behavior can be simulated accurately and establish a closer relationship to reality than other approaches in which the mechanism is in a more theoretical or abstract.
Here we combine the objectives of the three previous issues is now essential mix well.

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ASSEMBLY / SETS: Relationships. Motion's simulation. Analysis of the physical characteristics of the assemblies and your parts (weight, volume, center of gravity, interference between parts, etc..)(ENG) -ENSAMBLAJES / CONJUNTOS: Relaciones. Simulación de movimiento. Análisis de las características físicas de los conjuntos y las piezas (peso, volumen, centro de gravedad, interferencia entre piezas, etc.)	Learning time: 29h Laboratory classes: 11h Guided activities: 2h 30m Self study : 15h 30m

Description:
Once designed parts, these assemble to form a mechanism and to simulate your operative motion.
It is the culmination of the entire design process started on the subject 1 and which culminates in this issue 5.
It aims to identify and solve, efficiently, interference, design defects, incompatibilities between the shapes, boundaries ... etc.

Related activities:
Directed Activity in this content is the continuation of the Directed Activity 4. The student make a model of the schema and that must be operational to ensure that have correctly analyzed and developed the scheme chosen. Besides this activity targeted, the same dynamic continues in order to work on content of issues 2 and 3.

Specific objectives:
Learn to analyze mechanisms to link parts so that, once assembled virtually, analyze, with the maximum realism possible his behavior from the viewpoint of kinematics and perform operations and understand the operation of his components, not individually but in relation with the others (component operations in mechanism and mechanism operations in component)

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PLANS / DRAWINGS: Make a plan or standard representation of solid modeling and assemblies. This complement the content 1.	Learning time: 21h Laboratory classes: 7h Guided activities: 2h 30m Self study : 11h 30m

Description:

This content is complementary to the content 1 and is, basically, to achieve the standarized representation of the solids or assemblies made.
The representation is done using the possibilities of computer aided design software used.
They seek, as far as possible, which is achieved by customizing the features of the program.

Related activities:

To start this topic, all students have already made a significant number of parts and assemblies, is now trying to achieve representation of some of them and verify their correctness.
For practices are effective and can be performed without problems the size of the presentations is limited to ISO format A-3.
This is not a Directed Activity itself but is required to produce a significant number of examples printed on paper because there are significant errors which, in electronic formats, are not relevant.
Directed Activity of this issue is to make paper filing of the representation of assemblies and solids made in previous sessions using, or not, certain simplifications that the legislation allows.

Specific objectives:

Provide students approach and tools to decide what are the views, sections and simplifications that are best suited to the graphic representation of a piece or the whole mechanism.
Using the rules of representation to communicate clearly and specifically the characteristics of objects and their relationships.

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TOPOGRAPHIC SURVEY: General principles of representation. Dimension. Key symbols. Interpretation.	Learning time: 14h Laboratory classes: 4h Guided activities: 2h Self study : 8h

Description:
This is to provide students with basic skills to work with the information contained in a topographic survey.
As for making a topographical representation of the terrain, because of time and tools, the problems are based on the coordinates or position of the points and his level.

Related activities:
Students will topographic representations of land and get used to determine the characteristics thereof, scales, references, projections. Etc.
Directed Activity of this content is to find a topographic map with enough information to put in it a particular object: building, track, road, reservoir, etc.. and perform in the same, the appropriate changes.

Specific objectives:
Use topographic representation, principles, methods and general symbols.
Perform basic calculations and representation based on the position of a set of points: coordinates and elevations.

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TOPOGRAPHIC INTERVENTIONS: Placement and solving the problems of placement in an area of an object's project: building, road, deposits, aerial or underground ducts, etc..(ENG) - INTERVENCIONES TOPOGRÁFICAS: Colocación y solución de los problemas planteados por la colocación en un terreno de un proyecto: Edificio, camino, línea aérea o enterrada, etc.	Learning time: 15h Laboratory classes: 4h Guided activities: 2h Self study : 9h

Description:
It works in the making of adaptations of land and its representation.
Determine the embankments, excavations, profiles.
No specific programs were used to perform automatically the solution of complex problems. Students should learn and internalize the concept of manipulation and design of a ground or landscape.
The problems and examples given are elementary and focus on the correct representation and interpretation of them. It is intended that students acquire skills and expertise in the interpretation and representation of topographic surveys.

Related activities:
Simple and easy to understand problems are proposed.
The student will develop and represent them with simple computer's software.
The didactic methodology is very similar to item 1 but considering that the issue is not central and does not support further development.
The Directed Activity of this content is to find a topographic map and placed in this location a path suitable for a track, road, canal, etc..
The student should analyze the embankments, dumps, distances to the natural terrain, etc..

Specific objectives:
Understand and manipulate the ground for placing in specific areas.
Represent the area modified by the embankments and cuttings made.
Analyze the route alignments and paths and their relationship to the original ground.

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Regulations for carrying out activities

Directed activities:
Directed Activities:
All Directed Activities are carried out independently by the students. (Generic Competence C7)
The activity consume a number of hours that will be used to present and explain the activity and an initial part that is developed in the laboratory to ensure that the activity, its timetable and objectives have been clearly established.
The student develops the activity freely and can ask questions or further information on hours of consultation and laboratory practice if both coincide in time.
In activities 1, 4, 5 and 6 are valued the quality of the presentation according to the generic competences C4 and C6.

The scoring examinations on campus:
Given the experimental nature of the subject there is no scoring of theoretical activities.
Scoring activities (1) are based on problem solving similar to practices that directed teaching method.
These activities are personal and are conducted in a limited time starting and running out in the same session. Students may consult and use any information.
At the same way, the scoring activities (2) are activities are personal and are conducted in a limited time starting and running out in the same session. Are of multiple choice responses (Type "Test"). In these exams by their nature can not found any documents or aid.

The non scoring activities on campus:
It encompasses all activities except those two previous.
They are always completely practical and experimental activities. We propose a problem or situation to which the student has to find a solution. The student can choose from several statements of increasing difficulty.
Usually practices are continued outside the laboratory such that in the next session the student may choose to raise the level of the chosen practice or continue the already started until complete solution. Each student has a different level of progress although it is clearly established and the minimum level to be achieved. Obviously the student has all the information, help and documentation accurate and that each sees fit to collect.
It is important to ensure that each student do the exercises needed to get the minimum level before moving to the next content. In these practices the teacher obtains information from each student that is recorded in your record: level of difficulty of the chosen problems, questions asked, explanations to questions put to him, strategies used, etc. ..

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Bibliography

Basic:

Asociación Española de Normalización y Certificación. Dibujo técnico: normas básicas. 2a ed. Madrid: Ed. AENOR, 2001. ISBN 8481432717.

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Complementary:

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Sanjosé Blasco, J.J.; Martínez García, Emilio; López González, Mariló. Topografía para estudios de grado: geodesia, cartografía, fotogrametría, topografía (instumentos, métodos y aplicaciones), replanteo, seguridad del topógrafo en el trabajo. 2ª ed. ampl. y rev. Madrid: Bellisco, 2009. ISBN 9788496486898.

Others resources:

Hyperlink

Explicación clara y bien ilustrada de la interpretación de las normas y su aplicación práctica.

Explicación clara y bien ilustrada de la interpretación de las normas y su aplicación práctica

Explicación clara y bien ilustrada de la interpretación de las normas y su aplicación práctica

Explicación clara y bien ilustrada de la interpretación de las normas y su aplicación práctica.

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Contiene información y esquemas claros sobre teoría de máquinas y mecanismos.

Contiene información y esquemas de mecanismos de barras y otros de menor interés para este curso.

Repaso de los conceptos más elementales de los mecanismos de barras.

Interesante y didáctica página sobre mecanismos y matemáticas.