

250126 - GEODESCRIP - Descriptive Geometry

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| Coordinating unit: | 250 - ETSECCPB - Barcelona School of Civil Engineering |
| Teaching unit: | 751 - DECA - Department of Civil and Environmental Engineering |
| Academic year: | 2018 |
| Degree: | BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2017). (Teaching unit Compulsory) BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2010). (Teaching unit Compulsory) |
| ECTS credits: | 6 |
| Teaching languages: | Catalan, Spanish, English |

Teaching staff

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| Coordinator: | MARIO FERNANDEZ GONZALEZ |
| Others: | MARIO FERNANDEZ GONZALEZ, ISACÓ PÉREZ SOSA, DAVID ROMERO BLANCO |

Degree competences to which the subject contributes

Specific:

- 3052. Students will acquire spatial vision and graphic presentation skills using both traditional metric and descriptive geometry methods and CAD applications.
- 3053. Students will acquire the ability to select and use graphic presentation techniques and CAD programs to solve civil engineering problems.
- 3054. Students will acquire basic knowledge of the use and programming of computers, operating systems, databases and applications for engineering.

Transversal:

- 592. 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.
- 595. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
- 599. EFFECTIVE USE OF INFORMATION 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.
- 602. 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.
- 584. 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.

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Teaching methodology

This subject is taught with 4 lessons of one hour per week during 15 weeks.

Each week has 2 hours theoretical knowledge lessons, 1 hour is dedicated just to solve exercises and the last one is focused on practical laboratory class, having to be made in person compulsorily.

The 2 hour theoretical knowledge lessons take place in a big group of several students, where the teacher explains the concepts and the basic contents of the subject as it shows many examples of them with different type of exercises.

There exists one hour of class addressed to an small group of students where different kind of exercises are solved with the intention to consolidate the main and specific concepts and also for the lecture to be more interactive among all of them.

From the total of the 15 hours of practical lessons along the school year, 5 of them are for the continuous assessment test, 5 of them are for the teachers to solve the exercises and the following 5 ones are for the continuous assessment practices to be done.

Finally there is 1 hour of laboratory class in a reduced group of students, where the CAD tools and program's use will be taught.

According to the scheduled sessions, the SX-Y nomenclature it has been used, where the meaning is the following: "X" to indicate the week lesson (from 1 to 15) while "Y" indicates the type of lesson (1 for theory, 2 for solving exercises and 3 for the CAD labs lessons)

There exists a support material in the virtual campus, ATENEA, where a detailed teaching plan is located. There can be found information on it such as contents (pdf's notes), activities and learning assessment schedule (with past years exercises and exams) so as bibliography.

The final school year mark is obtained by adding the class exercises (30%) ,where personal exercises, Cad's lab practices and continuous assessment exercises are included, and the continuous assessment test (70%).

Learning objectives of the subject

Students will acquire knowledge of traditional complex graphic representation (descriptive geometry) techniques and learn about computer-assisted design applications in computer software commonly used in engineering.

Upon completion of the course, students will have acquired the ability to: 1. Solve complex geometry problems. 2. Use computer-assisted design software in complex geometry problems. 3. Develop multiview orthographic projections of complex geometry problems.

Numerical geometry, including the use of computer tools; Constructions in metric plane geometry; On-site layout, rendering and three-dimensional visualisation; Multiview orthographic projection, including homology, affinity, collapsing, shadows, polyhedra, and radiated, revolved and ruled surfaces



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Study load

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| Total learning time: 150h | Hours large group: | 30h | 20.00% |
| | Hours medium group: | 15h | 10.00% |
| | Hours small group: | 15h | 10.00% |
| | Guided activities: | 6h | 4.00% |
| | Self study: | 84h | 56.00% |



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Content



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| Item 01. Fundamentals. Points, lines and planes. | Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m |
| Description: | |

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S1-1. THEORY

Lesson 1. System elements; The point.

- 1.1 System elements definition.
- 1.2 Point representation.
- 1.3 Coordinate axes.
- 1.4 Identification of a point by its coordinates.
- 1.5 Different positions of the point
 - Point at 1st dihedral.
 - Point at 2nd dihedral.
 - Point at 3rd dihedral.
 - Point at 4 ° dihedral.
 - Point in the 1st bisector.
 - Point in the 2nd bisector.
 - Point in the vertical plane.
 - Point in the horizontal plane.
 - Point at the ground line.

Lesson 2. The straight line.

- 2.1 Straight line's representation.
- 2.2 Point contained in a line.
- 2.3 Traces of a line.
- 2.4 Line defined by two points.
- 2.5 Intersection of two lines.
- 2.6 Parallel lines. Parallel straight line by a point to another one.
- 2.7 Relative straight line's positions.
 - Horizontal straight line.
 - Front straight line.
 - Parallel straight line to the ground line.
 - Vertical straight line.
 - Edge straight line..
 - Straight line contained in the 1st bisector.
 - Straight line contained in the 2nd bisector.
- 2.8 straight line's views: hidden and views parts.
- 2.9 Straight line profile.
- 2.10 Profile plane abatement and profile plane disabatement.
- 2.11 Straight profile lines' intersection.
- 2.12 Parallel line to a profile lines passing by a determinate point.

Lesson 3. The plane.

- 3.1 Plane's representation.
- 3.2 Plane's points. Horizontal projection of a known point vertical projection or vice versa.
- 3.3 Straight line contained in a plane.
- 3.4 Straight lines individuals contained in a plane.
 - Front straight line.
 - Horizontal straight line.
 - Maximum slope straight line.
 - Maximum tilt straight line.

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3.5 Plane's particular positions.

- Vertical plane.
- Edge plane.
- Flat plane.
- Horizontal plane.
- Frontal plane.
- Parallel plane to the ground line.
- A plane that passes through the ground line.
- Perpendicular plane to the 1st bisector.
- Perpendicular plane to the 2nd bisector.

3.6 Traces of a plane defined by two lines.

3.7 Types of planes defined by a straight line.

- Vertical plane.
- Edge Plane.
- Parallel plane to the ground line..
- Perpendicular plane to the 1st bisector.
- Perpendicular plane to the 2nd bisector.

S1-2. PROBLEMS.

Non-school session. Reserve for continuous assessment test.



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| Item 02. Planes' and straight lines' intersections / Parallelism and perpendicularity. | Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m |
| Description: | |

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S2-1. THEORY

Lesson 4. Planes' and lines' intersections.

- 4.1 Two planes' intersection. General case.
- 4.2 Two planes' intersection. Particular cases:
 - Plans with traces cutting out of the picture.
 - Plans without trace, defined by two lines.
 - Plans with the four traces coinciding with the ground line.
 - One of the planes passing through the ground line.
- 4.3 Planes and straight lines' intersection.
 - Plane defined by its traces.
 - Plane defined by two straight lines.
 - Intersection of a line with a flat figure.
- 4.4 Relative position of crossing straight lines.
- 4.5 Views and hidden parts of an opaque plane and straight line's intersection.

Lesson 5. Parallelism and perpendicularity

- 5.1 Parallel planes.
- 5.2 Parallel straight line to a plane by a point..
 - General case.
 - Plane parallel to the ground line.
 - Plane passing through the ground line.
 - Parallel straight line to a plane by a point.
 - Parallel plane to two given straight lines by a point.
 - Parallel straight line by a point to a plane which is built by a given straight line.
 - Straight line supported in two ones' by a point.
 - Straight line supported in two ones' by a given direction.
- 5.3 Theorem of the three perpendicular.
- 5.4 Perpendicular line to a plane passing by a point:
 - General case.
 - Perpendicular plane to the ground or passing through the ground line.
 - Perpendicular plane to the bisectors.
- 5.5 Perpendicular plane to a line passing by a point.
- 5.6 Perpendicular straight line to other two ones. Common perpendicular.
- 5.7 Perpendicular plane to two ones:
 - Straight line's projections on a plane.
 - Orthogonal straight line to a given one which is build on another by a point.
 - Straight line contained in a plane which is perpendicular to another one by a defined plane point.
 - Straight line which is perpendicular and parallel to two different planes by a point.

S2-2. PROBLEMS

Non-school session. Reserve for continuous assessment test.

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| <p>Item 03. Homology and affinity.</p> | <p>Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m</p> |
| <p>Description: S3-1. THEORY</p> <p>Lesson 6. Homology</p> <p>6.1 Flat homology.</p> <ul style="list-style-type: none"> - Homology's properties and elements. - Relationship between center axis and straight edge lines. <p>6.2 Flat homology's definition types.</p> <ul style="list-style-type: none"> - With the center shaft and two homologous points. - With the center shaft and two homologous straight lines. - With the center, the axis and a limit straight lines. - With the center shaft and the other straight line edge. <p>Lesson 7. Affinity</p> <p>7.1 Flat Affinity .</p> <ul style="list-style-type: none"> - Affinity's properties and definition. <p>7.2 Affinity's definition: by the axis and two affinity points.</p> <p>7.3 Circunference affinity figure. Double straight lines and double points.</p> <ul style="list-style-type: none"> - Ellipse's axis determination. <p>7.4 Ellipse's affinity figures</p> <p>7.5 Axes of an ellipse known two conjugate diameters:</p> <ul style="list-style-type: none"> - Mannheim's construction. - Chasles's construction. - Affinity's method. <p>S3-2. PROBLEMS</p> <p>Non-school session. Reserve for continuous assessment test.</p> | |

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| <p>Item 04. Abatement Plan / circumference and distance.</p> | <p>Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m</p> |
| <p>Description: S4-1. THEORY</p> <p>Lesson 8. Plans' Abatment</p> <p>8.1 Plane's abatment on the horizontal plane:</p> <ul style="list-style-type: none"> - Point's abatement. - Straight line's abatement. Horizontal and frontal straight lines. - Flat figure's abatement. - Vertical and horizontal trace abatment. <p>8.2 Abatement using the affinity.</p> <p>8.3 Disabatment:</p> <ul style="list-style-type: none"> - Horizontal projection's determination. - Vertical projection's determination. <p>8.4 Plane's abatement on another one:</p> <ul style="list-style-type: none"> - Plan defined by its two traces. - Plan defined by two straight lines. <p>8.5 Vertical plane's abatment.</p> <p>Lesson 9. Circumference and distances</p> <p>9.1 Circumference's representation.</p> <ul style="list-style-type: none"> - Ellipse's axis horizontal projection. - Ellipse's axis vertical projection. - Maximum and minimum elevation height's points. - Maximum and minimum distance's points. - Far right and far left points location <p>9.2 Distance between 2 points: segment's true magnitude.</p> <p>9.3 Minimum distance between two crossing straight lines.</p> <p>9.4 Two parallel planes' distance.</p> <p>9.5 Two parallel lines's distance.</p> <p>9.6 Two points' distance in a plane.</p> <p>9.7 Distance between a point and an straight line.</p> <p>S4-2. PROBLEMS</p> <p>Non-school session. Reserve for continuous assessment tests.</p> | |



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| Item 05. Shadows and angles. | Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m |
| Description: | |

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S5-1. THEORY

Lesson 10. Shadows

- 10.1 Concepts, definitions and types.
- 10.2 Parallel and focal light.
- 10.3 Own and cast shadow.
- 10.4 Point's shadow cast:
 - over any plane.
 - over an horizontal plane.
 - over a vertical plane.
 - over the two projection's planes.
- 10.5 Segment shadow cast:
 - over any plane.
 - over the horizontal plane.
 - over the vertical plane.
 - over the two projection's planes.
- 10.6 Flat figure released shadow.
- 10.7 Flat figure's own shadow.
- 10.8 Straight line cast shadow over a flat figure.
- 10.9 Flat figure's cast shadow over another flat figure one.
- 10.10 Circle's cast shadow.
 - Parallel light.

Lesson 11. Angles

- 11.1 Straight lines forming a determinate angle with a plane by a point.
 - by any plane.
 - by a projection's plane.
- 11.2 Planes forming a determinate angle with a plane by a point.
 - by any plane.
 - by a projection's plane.
- 11.3 Straight line's angles with projection planes.
 - Angle's determination when straight line's are known.
 - Straight line's determination when angles are known.
- 11.4 Planes projection angles with a plane.
 - Angles' determination when plane are known.
 - Plane's determination when angles are known.
- 11.5 Angles between two lines:
 - when they cut themselves.
 - when they cross themselves.
- 11.6 Angle of two planes.
- 11.7 Angle between a straight line and a plane.
- 11.8 Plane's determination when angles between traces are known and the angle between a projection plane and the plane itself are known aswell.
- 11.9 Straight line parallel to a plane forming a determinate angle with a plane by a point.

S5-2. PROBLEMS

Non-school session. Pueba Rerserves for continuous assessment.

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| <p>Item 06. Auxiliary methods / trihedral.</p> | <p>Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m</p> |
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Description:
S6-1. THEORY

Lesson 12. Auxiliary Methods

12.1 Plane's changing method. Horizontal and vertical's changing plane.

- Point's representation.
- Line's representation.
- Plane's representation.

12.2 Change of planes of projection: applications.

- Straight line's conversion into a vertical one.
- Straight line's conversion into a straight edge one.
- Two lines minimum distance.

12.3 Vertical straight line or edge line's rotation:

- Point's rotation.
- Straight line's rotation.
- Plane's rotation.

12.4 rotation's applications:

- Straight line's conversion into a vertical one.
- Straight line's conversion into a straight edge one.
- Two lines minimum distance.

Lesson 13. Trihedral

13.1 Definitions, elements and representation.

13.2 Thriedral construction with a straight edge line and a side over the horizontal plane:

- when three sides are known.
- when two sides are known and the dihedral contained too.
- when two sides are known and so is the opposite dihedral to one of them.
- when two sides and its common edge are known.
- when two dihedrals and the opposite side of one of them are known.

13.3 Trihedral side's and diehdral's determination.

13.4 Trihedral's any position construction.

13.5 trirectángulo trihedral.

S6-2. PROBLEMS

Explanation exam problems from past years.

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| <p>Item 07. Polyhedra / regular tetrahedron.</p> | <p>Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m</p> |
| <p>Description: S7-1. THEORY</p> <p>Lesson 14. Polyhedra</p> <p>14.1 Definitions, elements and representation. 14.2 Regular Polyhedra (Platonic solids). Definition, views and hidden parts. 14.3 Polyhedron's intersection with a vertical plane. 14.4 Polyhedron's intersection with a straight line. 14.5 Polyhedron's interseccion with any plane 14.6 Polyhedra's shadows. 14.7 Regular Polyhedra: definition, enumeration and main section.</p> <p>Lesson 15. Regular tetrahedron</p> <p>15.1 Definition and description. 15.2 Properties. 15.3 Main Section. 15.4 Different flat sections. 15.5 Representations: - With an horizontal side. - With a vertical edge. - With two horizontal edges.</p> <p>S7-2. PROBLEMS</p> <p>Proposed problems resolution (problems of continuous assessment).</p> | |

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| Item 08. Regular hexahedron. | Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m |
| <p>Description:</p> <p>S8-1. THEORY</p> <p>Lesson 16. Regular hexahedron</p> <p>16.1 Definition and description. 16.2 Properties. 16.3 Main Section. 16.4 Different flat sections. 16.5 Representations: - With an horizontal side. - With a main vertical diagonal. - With a main section parallel to the horizontal plane.</p> <p>S8-2. PROBLEMS</p> <p>Explanation exam problems from past years.</p> | |

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| Item 09. Regular octahedron. | Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m |
| <p>Description:</p> <p>S9-1. THEORY</p> <p>Lesson 17. Regular octahedron</p> <p>17.1 Definition and description. 17.2 Properties. 17.3 Main Section. 17.4 Different flat sections. 17.5 Representations: - With an horizontal side. - With a vertical main diagonal. - With a main section parallel to the horizontal plane.</p> <p>S9-2. PROBLEMS</p> <p>Proposed problems resolution (problems of continuous assessment).</p> | |

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| <p>Item 10. Regular icosahedron and dodecahedron regular.</p> | <p>Learning time: 7h 11m Theory classes: 2h Practical classes: 1h Self study : 4h 11m</p> |
| <p>Description: S10-1. THEORY</p> <p>Lesson 18. Regular icosahedron</p> <p>18.1 Definition and description. 18.2 Properties. 18.3 Main Section. 18.4 Different flat sections. 18.5 Representations: - With an horizontal side. - With a diagonal vertical. - With a main section parallel to the horizontal plane.</p> <p>Lesson 19. Regular dodecahedron</p> <p>19.1 Definition and description. 19.2 Properties. 19.3 Main Section. 19.4 Different flat sections. 19.5 Representations: - With an horizontal side. - With a diagonal vertical. - With a main section parallel to the horizontal plane.</p> <p>S10-2. PROBLEMS</p> <p>Explanation exam problems from past years.</p> | |



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| Item 11. Radiating surfaces. | Learning time: 14h 23m Theory classes: 4h Practical classes: 2h Self study : 8h 23m |
| Description: | |

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S11-1. THEORY

Lesson 20. Radiating surfaces

20.1 Definition and classification.

20.2 Prisma

- 20.2.1 Representation.
- 20.2.2 Prism point's location.
- 20.2.3 Prism and straight line's intersection.
- 20.2.4 Prism and plane's intersection.
- 20.2.5 Prism's development.

20.3 Pyramid.

- 20.3.1 Representation.
- 20.3.2 Pyramid point's location.
- 20.3.3 Pyramid and straight line's intersection.
- 20.3.4 Pyramid and plane's intersection.
- 20.3.5 Pyramid's development.

S11-2.PROBLEMES

Proposed problems resolution (problems of continuous assessment)..

S12.1. THEORY

20.4 Cone.

- 20.4.1 Representation.
- 20.4.2 Points location on the cone.
- 20.4.3 Cone and straight line's intersection.
- 20.4.4 Cone's development.
- 20.4.5 Sections flat and true magnitude:
 - Circumference.
 - Oval.
 - Parable.
 - Hyperbola.
- 20.4.6 Cone's tangent planes:
 - by a surface's point.
 - by a external surface's point.
 - tangent plane's to a given direction.

20.5 Cylinder

- 20.5.1 Representation.
- 20.5.2 Cylinder's points location.
- 20.5.3 Cylinder and straight line's intersection.
- 20.5.4 Cylinder's development.
- 20.5.5 Sections flat and true magnitude:
 - Circumference.
 - Oval.
- 20.5.6 Cylinder's tangent planes:
 - by a surface's point.
 - by a external surface's point.
 - tangent plane's to a given direction.

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20.6 Shadows of surfaces (prism, pyramid, cone, cylinder)

- Own shadow.
- Cast shadow.

S12-2. PROBLEMS

Explanation exam problems from past years.

Item 12. The sphere.

Learning time: 7h 11m

Theory classes: 2h
Practical classes: 1h
Self study : 4h 11m

Description:

S13-1. THEORY

Lesson 21. The sphere

- 21.1 Sphere's projections.
- 21.2 Horizontal and vertical plane's sphere sections.
- 21.3 Sphere's points projections.
- 21.4 Horizontal straight line and sphere intersection.
- 21.5 Straight line and sphere's intersection.
 - by a straight line passing through the sphere's center.
 - by any straight line (rotation).
 - by any straight line (abatement case 1 on the horizontal plane)
 - by any straight line (abatement case 2 on the horizontal plane)
- 21.6 Sphere's section by a vertical plane passing it's center.
- 21.7 Sphere's section by an edge plane passing it's center.
- 21.8 Sphere's section by a vertical plane.
- 21.9 Sphere's section by an edge plane.
- 21.10 Sphere's tangent plane by a surface point.
- 21.11 Sphere's tangent plane passing through the ground line.
- 21.12 Sphere's tangent plane by a known direction.
- 21.13 Sphere's tangent plans containing an external straight line.
- 21.14 Sphere's intersection by any oblique plan passing throught its own center.
- 21.15 Cast and own sphere's shadows over projection's planes.
 - Abating's method.
 - Projecting planes' method.

S13-2. PROBLEMS

Proposed problems resolution (problems of continuous assessment).

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| <p>Item 13. Radiated surface intersection.</p> | <p>Learning time: 14h 23m Theory classes: 4h Practical classes: 2h Self study : 8h 23m</p> |
| <p>Description:</p> <p>S14-1. TEORIA</p> <p>Lesson 22. Radiated surface intersection</p> <p>22.1 Intersection of two surfaces, which have bases in the same plane of projection:</p> <ul style="list-style-type: none"> - Two pyramids. - Two cones. - Two cylinders. - Two prisms. - Cone and pyramid. - Cone and cylinder. - Pyramid and prism. - Cone and prism. - Cylinder and Pyramid. - Cylinder and prism. <p>S14-2. PROBLEMS</p> <p>Explanation exam problems from past years.</p> <p>S15-1. THEORY</p> <p>22.2 Surfaces intersections whose bases are in different projection's planes.</p> <p>22.3 Intersection of two surfaces. General case:</p> <ul style="list-style-type: none"> - The two sides have flat surfaces. - One surface has flat sides. - Any surface has flat sides. <p>22.4 Intersection among radiating surfaces and a sphere.</p> <p>S15-2. PROBLEMS</p> <p>Proposed problems resolution (problems of continuous assessment).</p> | |

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| <p>Item 14. CAD Lab.</p> | <p>Learning time: 36h Laboratory classes: 15h Self study : 21h</p> |
| <p>Description:</p> <ul style="list-style-type: none"> 14.1 Introduction. Description of the system. 14.2 Basic tools for 2D design: drawing. 14.3 Basic tools for 2D design: editing. 14.4 Management tools I: layers, properties and elements. 14.5 Management tools II: layers, properties and elements. 14.6 repetitive elements, blocks and attributes. 14.7 Dimensioning and text. 14.8 Presentations in paper space. 14.9 Settings for printing plans. 14.10 Introduction to 3D space: work plans and views. 14.11 Creation of solid primitives. 14.12 Boolean operations with solid. 14.13 Solid edition. 14.14 3D transformations. 14.15 Primitive surfaces and 3D meshes. <p>Specific objectives:</p> <p>The ultimate objectives of the CAD'slaboratory:</p> <ul style="list-style-type: none"> - Prepare the students to allow them to use informatic tools when solving geometric problems. - Identify and represent multiple views using the features of point, line drawings and objects, according to their location in space. - To identify and use the flat surfaces and volumes known geometry. - Application of modern tools in the graphical representation in the field of Civil Engineering. - Introducing students to the rational use of computers as a working basis, under the "interface" of operating systems and application specific software as a tool for 2D drawing. Always under the guidance of the conceptual structure to represent geometric projects and support of information technology in the field of technical drawing and descriptive geometry. | |

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Qualification system

The final score is the sum of partial scores following:

NPp: rating personal practices (15 practices)
NPcad: CAD's practices (5 practices)
NPec: continuous assessment practices rating (5 practices)
NEec1: continuous assessment rating 1 review
NEec2: continuous assessment test grade 2

The final practice mark is obtained from the following operation:

$$NP = 0.1 * NPp + 0.1 * NPcad + 0.1 * NPec$$

The final mark for continuous assessment tests will be:

$$NE = 0.35 * NEec1 + 0.35 * NEec2$$

The FINAL YEAR COURSE MARK is obtained from the following operation:

$$NFcurso = NP + NE + 0.1 * NF$$

(to the final grade will be added a 10% of the NF, if the student has followed the course properly, taking as a reference an attendance > 85% of the classes).

PRACTICE:

Students will have a collection of 20 exercises in Diedric system divided into two groups: personal practices and CAD's practices. In this collection, students must submit all of the practices conveniently resolved. Deliveries will be made on a date to be determined by the teacher.

The average of 15 personal practices and 5 of CAD will result in the qualification of personnel practices (NPP) and the rating practices of CAD (NPcad) respectively.

The practices will score a remarkable weight in the final of the subject, so it is recommended for implementation and the outmost care and attendance.

CONTINUOUS ASSESSMENT

Continuous assessment is to make different individual activities, additive and formative in nature, made during the course (classroom).

Continuous assessment is divided in two parts: the practice of continuous assessment and continuous assessment tests.

During the course, and in the days stipulated for such programming on the subject, there will be 5 continuous assessment practices, half of which will result NPec rating. Their weight in the final of the course is 10%.

There will be two exams, whose contents correspond to the subject taught in class until the date of each one of them. The weight of each of the final grade is 35%.

Final Exam (for students who have not obtained the approval of course), all matters shall be provided along the course.

Criteria for re-evaluation qualification and eligibility: Students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-



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attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

Regulations for carrying out activities

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

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