

## **GEOMETRY AND PROJECTION I**

Degree in Graphical Design

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Code: 11508

Main Scientific Area: Drawing

Lecturer: Raquel Maria Fernandes Costa

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 95h

ECTS: 6,0

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### **Objectives**

Discover the history and the cultural relations present in the concepts of geometry as a discipline that relates design, mathematics and art. Promote a rigorous and rational approach to drawing and the underlying mathematical principles in various systems of representation. Cultivating a spirit of rigor, discovering the potential of a rational approach to graphical representation and its communicative and plastic properties.

### **Learning Outcomes**

- Having the analytical ability to interpret visual and spatial forms geometrically;
- Enhancing creativity in the production of visual patterns using geometric transformation processes;
- Developing skills to create formal synthesis;
- Understanding and decoding representations in technical drawing, acquiring knowledge of its representation standards.

### **Course Contents**

Two-dimensional constructions:

Simple geometric constructions: parallelism, squareness, typology and properties of angles between two straight lines, properties and typology of polygons, homotheties, symmetries, concentricity and eccentricity between circumferences, notions of scale, etc.;

Tangency and concordances between lines and circles using various concepts and constructs: positive and negative dilation centers, radical axis of two circumferences and radical center of three circumferences.

Introduction to regular division of surface and symmetries in the plan.

Technical drawing:

Representation standards in technical drawing (dimensioning, subtitles, type of strokes, project sheets, representation and function of cuts and sections in standard technical drawings);

Distinction between European and American methods of projection;

Representation of polyhedrons;

Representation of solids of revolution;

Representation of compounds of solids of revolution (intersection of projecting plans with cylinders, cones, spheres, ellipsoids, and torus; intersection of solids of revolution: two cylinders, a cylinder and a sphere, a cylinder and a cone, two cone, a cylinder and an ellipsoid, a torus and a cylinder, etc.);

### **Recommended Bibliography**

Cunha, L. V. (1982). Desenho Técnico . Fundação Calouste Gulbenkian, Lisboa. Morais, S.(2007)

Desenho Técnico Básico 3, 24ª Edição . Porto Editora: Porto. Abajo, F. J.R.B.; Álvares, V. (1984)

Dibujo Tecnico . Ed. Donostiarra: San Sebastian, Espanha.

### **Learning and Teaching Methods**

The two work project submitted in Geometry and Projection I cover the main objectives of the course because: When addressing the divisions of regular surfaces the student comes into direct contact with various geometric constructions problems, including regular polygons, with a practical outcome of wide application in different areas of Design: standardization, modularization, illustration, etc. In the second work proposal the student have to represent accurately a wrought iron panel using only tangent circles and straight lines in order to verify the properties of the simplest geometrical shapes and their relations: secant, tangent, parallel, concentric, eccentric, etc. Finally the technical drawing is a crucial stage of the semester in which the student ceases to think only in twodimensional shapes and comes to represent three-dimensional objects. It is with this experience that the student begins to realize the problems of rigorous measurement and representation.

### **Assessment Methods**

Continuous assessment

The assessment system in this curricular unit is continuous assessment (according to point 1 of article 3 of the RACC of the ESD).

35% Project 01 > Isometries in the Plan (Visual patterns and regular surface division)

Creating original compositions of geometric patterns (2 studies in A3 sheets).

Study and analysis of Islamic patterns (1 study in A3 sheet).

35% Project 02 > geometric constructions and concordances

Interpretation and synthesis, in rigorous geometric design, a wrought iron panel.

Research (5%): 6 (six) studies on A3 sheets of parchment paper or millimetric paper in pencil, and previous studies of synthesis of form made with teacher monitoring.

Final Object (20%): pencil drawing on A3 paper

30% Written Test

30% of the evaluation will be dedicated to a theoretical and practical test carried out in class.

This test is of mandatory presence and execution.

#### Summary

35% (7 values in 20) - Project 01 > Isometries in the Plane [Proj.1]

35% (7 values in 20) - Project 02 > Geometric constructions and concordances [Proj.2]

30% (6 values in 20) - Written Test [Test]

Normal Season (N.S.) = (Proj.1 x 0,35) + (Proj.2 x 0,35) + (Test x 0,3)

#### Appeal period

This curricular unit does not allow exams (according to section 4 of article 4 of the RACC of the ESD) except as a complement to the continuous assessment.

In this sense the regular season exam will have a moderation of 20% of the grade, being the end-of-semester grade considered in the remaining 80%, according to the formula (SFG: semester final grade; ExG: exam grade; final grade after exam: FGAEx):  $SFG \cdot 0,8 + ExG \cdot 0,2 = FGAEx$

The minimum grade, in attendance, for access to the exam is 7 (seven) values. Any student with positive performance in the current curricular year may also improve their grade at this time, with the calculation of the grade equivalent to the above mentioned.

#### Special Season Assessment

This season is only available for students who are in the special frequency regime (as described in section I, article 135 and point 5, article 209 of the Academic Regulation of IPCA). The student must inform the teacher of his intention to apply for the special season. The Special Season Exam of this Curricular Unit consists in a test to be taken in a single moment in the day scheduled for that purpose.