UNICUSANO
ROME

Code: ICAR/17 **Credits: 9**
Course: Technical Drawing
Main language of instruction: Italian
Other language of instruction: English

Teaching Staff

Head instructor
Prof. Stefano PAPA – stefano.papa@unicusano.it

Introduction

1. *Objective of the course:*

The course is a course of the second year of the Civil Engineering degree course and is divided into six main parts (see course programme), each of which is made up of modules. Each module consists of a video lesson and a part of the lecture notes. On the platform, at the end of the modules relating to theory, there are exercises and self-evaluation tests, useful for student for a better in-depth study of the topics covered and to verify their level of preparation. The course aims to provide the tools and techniques necessary for mastering the fundamental principles and the representation methods underlying the drawing. At the end of the course the student will have knowledge and mastery of the concepts underlying the drawing, both traditional and digital, and of the correct interpretation and graphic design of a project.

Objectives

The course has the following educational objectives:
1. Review the basics of Euclidean geometry
2. Illustrate the principles on which projective geometry is based
3. Illustrate the different methods of representation
4. Illustrate the fundamental principles for the graphic representation of a project
5. Explain the basic operation of CAD programs

Competencies:

Knowledge and understanding at the end of the course the student will have demonstrated that he has acquired knowledge relating to the different methods of representation and basic information for the development of a technical drawing.
The student will have mastered the principles and tools necessary for the graphic representation of a project, also using CAD software.
Application of knowledge: the student will be able to draw flat and solid figures using different representation methods. The Etivities involve the application of the theoretical knowledge acquired to practical problems that can be solved also with the aid of CAD software.
Ability to learn: at the end of the course the student will have knowledge of the fundamental notions necessary for graphic processing of a project. The course will allow him to have the knowledge necessary for correct interpretation and processing graphics of a project. This ability will subsequently support him in the processing of graphic representations required in subsequent courses.

Syllabus

2. *Programme of the course:*

ELEMENTS OF EUCLIDEAN GEOMETRY and FUNDAMENTALS OF PROJECTIVE GEOMETRY (Modules 1-3; commitment of approximately 14 hours, week 1)
Fundamental elements: point, line, plane. Projective Space: improper point, improper line, improper plane. Fundamental forms of I, II, III species. Duality principle. Fundamental operations: Projection and Section (cylindrical and conical projection, projection centers). Projectivity and perspectivity – Homography. Homology: definition, centers, axes. Properties of homology. Special cases of homology: affinity, homothety, translation. Reversal homology. Limit lines. Etivity 1 (12 hours of study – week 1) - Representation of a flat figure using homology
MONGE METHOD (Modules 4-8; commitment of approximately 15 hours, week 2)
General concepts. Reference in space and in the plane. Point representation. Representation of the straight line. Representation of the plan. Affinity conditions, parallelism, perpendicularity. Reversal of the plan projecting and a generic plane. Representation of a regular polygon. Exercises. Etivity 2 (12 hours of study load – week 2) - Orthogonal projections of a solid.

AXONOMETRY (Modules 9-13; commitment of approximately 14 hours, week 3)
General concepts. Orthogonal axonometry. Oblique axonometry. Representation axonometric of a point. Axonometric representation of a straight line. Axonometric representation of a plane. Affinity condition, parallelism, perpendicularity. Exploded views and axonometric cross-sections. Exercises.
Etivity 3 (12 hours of study load – week 3) - Axonometric representation of a solid
PERSPECTIVE (Modules 14-22; commitment of approximately 26 hours, weeks 4-5)
General concepts. Vertical frame perspective: reference in space and on the plane; representation of entities fundamentals; perspective methods; perspective heights; exercises. Perspective an inclined framework: reference in space and on the plane; representation of key entities; exercises.
Etivity 4 (12 hours of study load – week 5) - Perspective representation of a solid
CONIC SECTIONS (Modules 23-26; approximately 14 hours, week 6) Definitions and genesis. Ellipse. Parable. Hyperbole.
DEFINITION OF GRAPHIC MODELS (Modules 27-37; commitment of approximately 32 hours, week 7-8-9) Proportion and modularity. Reference legislation for technical drawing and graphic conventions. Sheet formatting and squaring. Architectural drawing. Representation scales. Dimension systems. Graphic representation of a scale. Survey drawing – general concepts. Urban design – general concepts. Computer design – concepts general.
VERIFICATION EXERCISES (Modules 38,39,40,42,43; commitment of approximately 30 hours, weeks 10-11)
Exercises on exam tracks and similar exercises.
SELF-ASSESSMENT TEST (approximately 10 hours)

Evaluation system and criteria

The exam consists of carrying out a written test aimed at ascertaining analysis and re-elaboration skills of the concepts acquired and a series of activities (Etivity) carried out during the course in classes. The evaluation of the Etivities, from 0 to 5 points, is carried out on an ongoing basis during the duration of the course. The conduct of the Etivities is recommended for tackling the "exercises to be submitted for the exam" exercises (part of the exam itself) with greater mastery.
Students are required to submit the exercises requested in the "materials" section (file "exercises from submit for the exam") in order to take the exam. These exercises constitute an integral part of the exam itself. The final grade of the exam will be determined by the evaluation of the exercises (which will influence for 1/3) and the written test (which will influence 2/3). The expected learning outcomes regarding

subject knowledge and the ability to apply it are assessed through the written test, while the self-learning ability is assessed on-going through the Etivities.

Bibliography and resources

3. *Materials to consult*

Notes written by the instructor are available in Italian (part of the notes are also available in English).

4. *Recommended bibliography*

Suggested readings are:

▪ Dell'Aquila M. (2002), Il luogo della geometria. Arte tipografica, Napoli.
▪ Docci M., Maestri D., Gaiani M. (2017), Scienza del disegno. Città Studi Edizioni.
▪ Docci M., D. Maestri (2009), Manuale di rilevamento architettonico e urbano. Laterza.
▪ Docci M., Migliari R. (1992), Scienza della rappresentazione: fondamenti e applicazioni della geometria descrittiva. La Nuova Italia Scientifica, Roma.
▪ Sgrosso A. (1996), La rappresentazione geometrica dell'architettura. Applicazioni di geometria descrittiva. UTET Università