



# UNIVERSITÀ DEGLI STUDI DI PALERMO

|                              |                                                                                                                                |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| DEPARTMENT                   | Ingegneria                                                                                                                     |
| ACADEMIC YEAR                | 2022/2023                                                                                                                      |
| BACHELOR'S DEGREE (BSC)      | CIVIL ENGINEERING                                                                                                              |
| SUBJECT                      | DESIGN AND CAD                                                                                                                 |
| TYPE OF EDUCATIONAL ACTIVITY | B                                                                                                                              |
| AMBIT                        | 50277-Ingegneria civile                                                                                                        |
| CODE                         | 07873                                                                                                                          |
| SCIENTIFIC SECTOR(S)         | ICAR/17                                                                                                                        |
| HEAD PROFESSOR(S)            | INZERILLO LAURA      Professore Associato      Univ. di PALERMO                                                                |
| OTHER PROFESSOR(S)           |                                                                                                                                |
| CREDITS                      | 9                                                                                                                              |
| INDIVIDUAL STUDY (Hrs)       | 121                                                                                                                            |
| COURSE ACTIVITY (Hrs)        | 104                                                                                                                            |
| PROPAEDEUTICAL SUBJECTS      |                                                                                                                                |
| MUTUALIZATION                |                                                                                                                                |
| YEAR                         | 1                                                                                                                              |
| TERM (SEMESTER)              | 1° semester                                                                                                                    |
| ATTENDANCE                   | Not mandatory                                                                                                                  |
| EVALUATION                   | Out of 30                                                                                                                      |
| TEACHER OFFICE HOURS         | <b>INZERILLO LAURA</b><br>Monday    12:00    13:00    DIPARTIMENTO DI INGEGNERIA EDIFICIO 8EX DICAM<br>PIANO TERRA STANZA 0018 |

DOCENTE: Prof.ssa LAURA INZERILLO

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PREREQUISITES</b>          | The student is not expected to have specific skills.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>LEARNING OUTCOMES</b>      | <p>Knowledge: The student knows the general principles of projection and the specific features of parallel and perspective projection, so as the peculiar features of surfaces generated by the movement, revolvment (or the combination of both) of a figure.</p> <p>Understanding: The student is able to make out the features of a spatial layout starting from its graphic or photographic representation.</p> <p>Applying knowledge and understanding: The student is able to draw architectural elements (stairs, vaults) by means of pencil or ink, using orthogonal and oblique projection and perspective. The student is otherwis able to draw a house in orthogonal axonometry and in perspective.</p> <p>Making judgements: The student understands the links between design and representation.</p> <p>Communication skills: The student is able to draw correct drawings that properly represent the features of architectural elements and of a house.</p> <p>Learning skills: The student is able to study architecture both interpreting and producing drawing, according to a habit long practiced by Engigneer.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>ASSESSMENT METHODS</b>     | <p>The mark, reported in thirtieths, will result from the sum of three scores in tenths, where 6 means sufficient and 10 means excellent. Full marks will be granted if the sum of the scores is 30 and if the student leads the discussion with self-confidence.</p> <p>Score 1: Graphic test focusing the drawing of solids, of architectural elements (e.g. vaults and stairs) and the restitution of distances, angles and shapes from a given drawing or a photo.</p> <p>Score 2: Oral test, focusing the fundamentals of the Science of representation: the questions will start from the discussion on theoretical assumptions implicit in the graphic test; the student will be asked to make free hand drawings which refer to the discussed subjects. If some errors appear in the graphic test, the student will have the opportunity to discuss them with the commission.</p> <p>Score 3: Assessment of 10 plates in the format A2 (59,4*42cm) drawn with different techniques (pencil, black and colored inks) and on different papers (opaque and transparent). The plates will focus the representation of simple solid and architectural elements (opaque paper), the restitution from given drawings or photos (transparent paper) and the representation of a house in orthogonal axonometry and perspective (opaque paper).</p> <p>The scores will be assigned according to the following criteria: Graphic test<br/>Excellent (10): the graphic test is performed with no errors and a good graphic.<br/>Very good (9): the graphic test is performed with no errors and a satisfactory graphic.<br/>Good (8): the graphic test is performed with one error. Satisfactory (7): the graphic test is performed with two errors. Passing grade (6): the graphic test is performed with three errors<br/>Unsatisfactory: the graphic test is performed with more than three errors</p> <p>Oral test<br/>Excellent (10): the student proves a full mastery of the theoretical fundaments of the Representation science and, at the same time, is able to apply the concepts to exercises that are unfamiliar to him/her.<br/>Very good (9): the student proves a full mastery of the theoretical fundaments of the Representation science but reveals uncertainty in applying the concepts to exercises that are unfamiliar to him/her.<br/>Good (8): the student proves a good mastery of the theoretical fundaments of the Representation science and is able to evaluate the correspondence between the concepts and their application.<br/>Satisfactory (7): the student proves a good mastery of the theoretical fundaments of the Representation<br/>Passing grade (6): the student proves having studied the theoretical fundaments of the Representation science, but shows gaps in autonomous application.<br/>Unsatisfactory: the discussion shows gaps in the knowledge of the theoretical fundaments of the Representation science.</p> <p>Plates<br/>Excellent (10): The plates are correct and their graphic quality is excellent. Very good (9): The plates are correct and their graphic quality is very good. Good (8): The plates are correct and their graphic quality is very good. Satisfactory (7): The plates show one or two graphic errors.<br/>Passing grade (6): The plates show one or two conceptual errors<br/>Unsatisfactory: The plates show more than two conceptual errors.</p> |
| <b>EDUCATIONAL OBJECTIVES</b> | <p>Knowledge of the subjects underlying the transfer of spatial relations on a plane support (paper) and the inverse, that is finding out spatial relations from drawings.</p> <p>Comprehension of the links between the forms of architectural design and the forms of its representation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                               |                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | Knowledge of the geometrical layout of surfaces and of the process leading to determine the intersection between a surface and a straight line, a plane and another surface.                                                                                                                                             |
| <b>TEACHING METHODS</b>       | Teaching activity is made of lessons and of tests addressed to evaluate the response of students to the discussed subjects. The teacher reserves one morning a week (Monday from 9.00 to 13.00 in his room at the Building 8, first floor) to meet the students who need further explications or the review of drawings. |
| <b>SUGGESTED BIBLIOGRAPHY</b> | Riccardo Migliari, Geometria Descrittiva, 2 vol., CittaStudi, Roma 2009.<br>Laura Inzerillo, assonometria e futuro, Aracne editrice, Roma, 2012, 978-8854851245<br>Laura Inzerillo, essere prospettici, aracne editrice, Roma, 2012, 978-8854849624<br>Dispense del corso.<br>Video corso su youtube.                    |

## SYLLABUS

| <b>Hrs</b> | <b>Frontal teaching</b>                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4          | Introduction to the course. The section and projection process.                                                                                                                                                                                                                                                                                                                                                                        |
| 5          | Monge projection. Representation of: point, straight line, plane. Particular points, straight lines, planes. Points on a straight line, straight lines on a plane. straight lines and plane that are parallel. Concept of the infinite in the space. Overlapping of a plane. Real form and real dimension of a polygonal figure. Meaning of the homology. Representation of a conic curve on a generic plane and on particular planes. |
| 16         | Monge projection: intersection between plane and pyramide, plane and cone, plane and cylinder, plane and sphere. Intersection between straight line and pyramid, intersection between straight line and prism, intersection between straight line and cone, intersection between straight line and cylinder, straight line and sphere.                                                                                                 |
| 3          | Classification of surfaces                                                                                                                                                                                                                                                                                                                                                                                                             |

| <b>Hrs</b> | <b>Practice</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9          | Monge projection: intersection between solids. intersections between cylinder with the same either different ray. Intersection between cone and cylinder, cylinder and sphere. Representation of quadric curves: bull, hyperbolic paraboloid, parabolic paraboloid. Architectonic elements: caracol, vault, cylinder vault.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4          | Exercises on orthogonal parallel projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4          | parallel projections: applications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 5          | Exercises on oblique axonometry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 8          | Orthogonal and oblique assonometry. Representation of: point, straight line, plane. Particular points, straight lines, planes. Points on a straight line, straight lines on a plane. straight lines and plane that are parallel. Concept of the infinite in the space. Overlapping of a plane. Real form and real dimension of a polygonal figure. Meaning of the homology. Representation of a conic curve on a generic plane and on particular planes. Concept of generating straight line and direct curve. Pyramid, regular prism. Pyramid on a generic plane and on particular plane. Prism on a generic plane and on particular plane. Regular and oblique pyramid, regular and oblique prism. Representation of superior order conics. Cylinder and Cone. representation of cone and cylinder on oblique and generic planes either particular planes. representation of the sphere. Point on a Sphere, tangent plane to the sphere. Tangent sphere to a plane. intersection between plane and pyramide, plane and cone, plane and cylinder, plane and sphere. Intersection between straight line and pyramid, intersection between straight line and prism, intersection between straight line and cone, intersection between straight line and cylinder, straight line and sphere. intersection between solids. intersections between cylinder with the same either different ray. Intersection between cone and cylinder, cylinder and sphere. Representation of quadric curves: bull, hyperbolic paraboloid, parabolic paraboloid. Architectonic elements: caracol, vault, cylinder vault. |
| 2          | Assonometric representation: applications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4          | Straight lines orthogonal to a plane in perspective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4          | Exercises on perspective.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 4          | Outline of cone, sphere and cylinder in orthogonal and oblique parallel projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 4          | Representation of barrel, sail, cross and pavilion vaults and of multiple light and spiral stairs in orthogonal and oblique parallel projection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| <b>Hrs</b> | <b>Workshops</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7          | Monge projection: solid representation. Concept of generating straight line and direct curve. Pyramid, regular prism. Pyramid on a generic plane and on particular plane. Prism on a generic plane and on particular plane. Regular and oblique pyramid, regular and oblique prism. Representation of superior order conics. Cylinder and Cone. representation of cone and cylinder on oblique and generic planes either particular planes. representation of the sphere. Point on a Sphere, tangent plane to the sphere. Tangent sphere to a plane. |

| Hrs | Workshops                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4   | grapho-numerical projection: representation of a point, straight line, plane. particular point, straight lines, plans. Point on a straight line, straight line on a plane. Parallelism. Overlapping of a plane. real form and dimension of a plane figure. homology. Representation of a conic in a generic and a particular plane. Representation of the solid volumes. Pyramid and prism on a generic and particular plane. Regular and oblique pyramid and prism. Cylinder and cone horizontal or on a generic and oblique plane. Sphere. Intersection between solid volumes and plane and between themselves. Intersection between straight line and plane and pyramide and cone and cylinder and sphere |
| 2   | Straight lines on a generic plane in assonometric.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4   | extreme samples: Grapho numeric projections, multiple orthogonal projections, assonometric projections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3   | applications of civil manufactures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |