Private University of Tacna (UPT)
School of Architecture
Syllabus 2027-I

1. COURSE

AR1R1. Geometry and Analog Drawing (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1R1. Geometry and Analog Drawing
2.2 Semester	:	1st Semester.
2.3 Credits	:	4
2.4 Hours	:	2 HT; 4 HP;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	None

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Geometry and Analog Drawing is the entry point of the Representation sequence (Analog Drawing I – Digital Drafting II – 3D Modeling and Animation III), which escalates from hand drawing to CAD/BIM to parametric 3D/XR over the first three semesters. Before any digital tool is introduced, students must master the underlying descriptive- geometry logic (projection, axonometry, perspective) and the drafting conventions (line weights, dimensioning, symbology) that every later digital workflow still encodes. The course grounds this in real urban elements – street sections, lots, public-space plans – rather than abstract solids, so the representational skill is immediately usable in the urbanism studio sequence.

5. GOALS

- Apply descriptive-geometry principles (orthogonal projection, axonometry, conic perspective) to represent three-dimensional objects and spaces on a two-dimensional surface.
- Produce technical drawings by hand – plans, elevations, sections, and perspectives – following ISO/ANSI drafting conventions for line weights, dimensioning, scale, and symbology.
- Translate field observations (site sketches, measured surveys) into coordinated technical drawings suitable for urban and territorial analysis.

6. COMPETENCES

AG-A04) Communicates effectively and inclusively with the architecture community and society through reports, design documentation, and presentations tailored to different audiences. (Assessment)

AG-A07) Applies knowledge of mathematics, natural sciences, and information technology to architectural, urban, and interior design solutions. (Assessment)

7. TOPICS

Unit 1: Euclidean and Projective Geometry (32 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Euclidean geometry: axioms, congruence, similarity, and classical theorems • Isometries of the plane and space: reflections, rotations, translations, and glide reflections • Symmetry groups: frieze groups, wallpaper groups, and the classification of finite isometry groups • Projective plane: homogeneous coordinates, duality, and cross-ratio • Conic sections in projective geometry: classification and projective transformations	• Describe the axiomatic foundation of Euclidean geometry and identify the role of the parallel postulate [Familiarity] • Classify isometries of the plane and determine the symmetry group of a given geometric figure [Usage] • Apply projective coordinates and duality to prove classical theorems (Pappus, Desargues) [Assessment]
Readings : [Ear96], [Chi15]	

Unit 2: Orthographic Drawing and Conventions (32 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Orthographic projections: plan (cut plane at typical eye level or 1.5 m), section (cut through building, showing structure and spatial relationship), elevation (external • Paraline drawings: isometric (equal angles, true scale), axonometric (plan oblique, elevation oblique), and their use in showing spatial depth without perspective distortion • Perspective (conic projection) drawing: one-, two-, and three-point perspective construction, vanishing points, horizon line, and station point – the convergent-projection family used for experiential and presentation views, as distinct from the parallel-projection conventions of orthographic and paraline drawing • Freehand architectural sketching and schematic diagrams: quick observational sketches and on-site architectural studies ("apuntes") to record buildings and spaces, line quality and proportion by eye, light tonal shading, and parti, bubble, and concept diagrams as a loose, interpretive mode of representation distinct from measured hard-line drawing • Line weight conventions: hierarchy of outline, section cut, foreground, middle ground, background, and hidden lines • Drawing set organization: title block, sheet numbering, drawing index; relationship between plans (architectural, structural, MEP, reflected ceiling), elevations, sections, • Dimensioning and annotation: string dimensions, overall dimensions, grid lines, spot elevations, section marks, finish labels, door and window tags • Normalization of plan representation: ISO 128 (general principles) and ISO 5455 (scales) as international references; national drawing-set and plan-presentation requirements for permit submission (e.g. Peru's Reglamento Nacional de Edificaciones under Ley 29090)	• Identify the standard orthographic, paraline, and perspective drawing types - plan, section, elevation, axonometric, isometric, one/two/three-point perspective - as well as freehand architectural sketching and diagrammatic schemas, and describe their respective uses [Familiarity] • Produce a set of orthographic drawings (plan, section, elevation) for a small building that consistently applies line weight conventions, dimensioning, [Usage] • Evaluate a set of architectural drawings for clarity, completeness, and adherence to graphic standards, identifying missing dimensions, inconsistent line weights, [Assessment]
Readings : [Chi15], [Wel20]	

Unit 3: Graphic Symbols and Drafting Conventions (32 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Architectural element symbols: door swing and window types in plan, wall representation and hatching by material (concrete, masonry, drywall, wood), and stair/ramp conventions (up/down arrows, break lines, nosing) • Furniture and fixed-equipment symbols: furniture blocks (seating, tables, beds), kitchen and bathroom fixtures, and standard clearances shown in plan • Building-systems symbol libraries: electrical symbols (outlets, switches, lighting fixtures, panels) and plumbing/sanitary symbols (fixtures, supply and drainage lines) • Material hatching and texture conventions in plan and section: concrete, earth, insulation, wood, and stone, and their standard graphic representation • Landscape and site symbols: planting symbols by canopy size and species type, paving and hardscape textures, and vehicle/parking symbols for site plans • Signage and wayfinding symbols: accessibility pictograms, means-of-egress and exit signage, and room-numbering conventions • Structural drawing conventions: column/structural grid notation, beam and slab representation, and reinforcement symbols in structural drawings	• Identify the standard graphic symbols for architectural elements, furniture, building systems (MEP), site/landscape features, signage, and structural components [Familiarity] • Apply standard symbol and hatching conventions consistently across a set of architectural drawings, including furniture, MEP, landscape, and structural symbols [Usage] • Evaluate a set of architectural drawings for correct and consistent use of graphic symbols and conventions, identifying non-standard or ambiguous symbol use [Assessment]
Readings : [Chi15]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

********* EVALUATION MISSING ********

10. BASIC BIBLIOGRAPHY

[Ear96] James H. Earle. *Engineering Design Graphics*. 8th. Addison-Wesley, 1996.

[Chi15] Francis D. K. Ching. *Architectural Graphics*. 6th. Wiley, 2015.

[Wel20] Barbara L. Wellman. *Technical Drawing 101 with AutoCAD*. 5th. Pearson, 2020.