Private University of Tacna (UPT)

Faculty of Architecture and Urban Planning

School of Architecture

Book of Syllabi

– 2027-I–

Lima: November 6, 2026

Equipo de Trabajo

Contents

First Semester **7**
1.1 AR1B1. Introduction to BIM . . . 7
1.2 AR1D1. Design Studio I . . . 11
1.3 AR1R1. Geometry and Analog Drawing . . . 16
1.4 MA100. Basic Mathematics . . . 20
1.5 MA111. Calculus I . . . 23
1.6 EG163. Communication I . . . 25
1.7 EG164. Digital Competencies Development . . . 28
1.8 EG165. Strategies for Autonomous Learning . . . 31
1.9 EG166. Basic Mathematics . . . 34

Second Semester **37**
2.1 AR1B2. Parametric Modeling and Generative Design . . . 37
2.2 AR1D2. Design Studio II . . . 41
2.3 AR2R1. Digital Drafting . . . 47
2.4 ID101. Technical and professional English I . . . 50
2.5 EG263. Communication II . . . 54
2.6 EG264. Philosophy . . . 57
2.7 EG265. Peruvian Territory. National Defense and Security . . . 60

Third Semester **63**
3.1 AR1D3. Design Studio III . . . 63
3.2 AR2B1. Multidisciplinary Coordination . . . 67
3.3 AR3R1. 3D Modeling and Virtual Animation . . . 70
3.4 ID102. Technical and professional English II . . . 74
3.5 EG364. Ethics . . . 78
3.6 EG366. Personal Development and Leadership . . . 81

Fourth Semester **84**
4.1 AR1T1. Digital Topography . . . 84
4.2 AR2B2. BIM Execution Planning . . . 88
4.3 AR2D1. Design Studio IV . . . 91
4.4 ID201. Technical and professional English III . . . 96
4.5 EG363. Ecology and Sustainable Development . . . 100
4.6 EG365. Peru's Problems and Challenges in a Global World . . . 103

Fifth Semester **106**
5.1 AR2B3. BIM Scheduling and Cost . . . 106
5.2 AR2D2. Design Studio V . . . 109
5.3 ID202. Technical and professional English IV . . . 114

Sixth Semester **118**
6.1 AR2D3. Design Studio VI . . . 118
6.2 AR3B1. Structural and MEP Coordination . . . 123
6.3 ID203. Technical and professional English V . . . 126

Seventh Semester **130**
7.1 AR3B2. Sustainability and Circular Economy . . . 130
7.2 AR3D1. Design Studio VII . . . 133
7.3 AR400. Scientific Research Methodology . . . 138

Eighth Semester **142**
8.1 AR3B3. Facilities Management . . . 142
8.2 AR3D2. Design Studio VIII . . . 145
8.3 AR401. Statistics and Research Instruments . . . 150

Ninth Semester **154**
9.1 AR3B4. Heritage and Infrastructure . . . 154
9.2 AR3D3. Design Studio IX . . . 158
9.3 AR402. Research Workshop . . . 163

Tenth Semester **166**
10.1 AR3D4. Design Studio X . . . 166
10.2 AR403. Research Work . . . 171
10.3 AR404. Innovation and Entrepreneurship . . . 173
10.4 AR4B1. AI-Assisted Automation . . . 177

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

1. COURSE

AR1B1. Introduction to BIM (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1B1. Introduction to BIM
2.2 Semester	:	1st Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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

Introduction to BIM opens the ten-course BIM I-X sequence (AR1B1 to AR4B1) that runs obligatorily alongside the Design Studio and Representation lines across the whole program. As the first course in the sequence, it has no prerequisite: it introduces students to Building Information Modeling as an object-based, data-centric way of working, teaches them to produce a complete construction documentation set directly from a BIM model instead of drafting it separately, and establishes the file-organization and worksharing habits that every later, team-based BIM course in the sequence depends on. The course's transversal Practicum unit – a hands-on software-lab component that recurs, unchanged in structure, across all ten courses of the sequence – gives students graded, guided exercises in the authoring tool itself, building the baseline software fluency the rest of the sequence (coordination, scheduling, cost estimation, structural and MEP integration) will build upon.

5. GOALS

- Explain and apply the foundational concepts of Building Information Modeling – object-based parametric modeling, authoring tools, level of development (LOD), and open data exchange – by building a simple BIM model and exporting it to IFC.
- Produce a complete, model-derived construction documentation set (sheets, views, schedules, and model-linked annotations) ready for permit submission.
- Organize a BIM project file for team-based production, applying naming conventions, worksets, and linked models, and resolve a basic worksharing conflict.
- Build hands-on proficiency in a BIM authoring tool through a sequence of guided, graded practicum exercises culminating in a cumulative deliverable.

6. COMPETENCES

AG-A03) Performs effectively as an individual and as a member or leader in diverse, inclusive teams, in multidisciplinary in-person and remote environments. (Usage)

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

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

7. TOPICS

Unit 1: BIM Fundamentals and Authoring (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Core BIM concepts: object-oriented modeling (walls, doors, windows with embedded data), parametric relationships (hosting, constraints), and the difference between BIM and conventional 2D/3D modeling • BIM authoring tools: Revit (project-based, family editor), ArchiCAD (virtual building model), Vectorworks, and their respective modeling philosophies and interoperability • Level of development (LOD) specification: LOD 100 (conceptual), 200 (schematic), 300 (detailed), 350 (construction-ready), 400 (fabrication), 500 (as-built) • Data exchange standards: Industry Foundation Classes (IFC) as openBIM exchange format, IFC schema (IfcWall, IfcDoor, IfcWindow, IfcSpace), and vendor-neutral model interoperability	• Describe the core concepts of BIM: object-based modeling, parametric relationships, LOD, and data exchange via IFC, and explain how BIM differs from traditional 2D CAD [Familiarity] • Develop a BIM model of a small building at LOD 200-300, producing plans, sections, elevations, and a simple schedule directly from the model, and export the model to IFC format [Usage] • Evaluate a BIM model for appropriate LOD, correct parametric relationships, and clean IFC export, identifying modeling errors that would impede downstream coordination or data exchange [Assessment]
Readings : [Eas+11]	

Unit 2: BIM-Based Construction Documentation (24 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Sheet and view setup from the model: plan, section, elevation, and detail views generated directly from the BIM model, view templates, and view-specific graphic overrides • Automated schedule generation: door, window, room finish, and area schedules extracted live from model data, and their coordination with drawing sheets • Model-based annotation and tagging: dimension strings, keynotes, and tags linked to model elements so they update automatically when the model changes • Export formats for documentation delivery: PDF sets, DWG export for consultants without BIM authoring tools, and print/plot configuration for a full drawing set	• Describe how a construction documentation set (plans, sections, elevations, schedules) is produced directly from a BIM model rather than drawn separately [Familiarity] • Produce a coordinated set of sheets, views, and schedules from a BIM model, keeping annotations and tags linked to model elements [Usage] • Evaluate a model-derived documentation set for completeness, internal consistency, and readiness for permit submission or construction [Assessment]
Readings : [Sti21]	

Unit 3: BIM Model Organization and Worksharing (24 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• Project templates and file structure: starting templates, worksets, linked vs. inserted models, and project browser organization • Naming and numbering conventions for models, sheets, and views, aligned with a project's BIM Execution Plan • Worksharing mechanics: central/local file models, element ownership and borrowing, sync-with-central workflow, and conflict resolution between team members	• Describe how a BIM project file is structured into worksets, links, and templates, and how multiple team members edit it concurrently through worksharing [Familiarity] • Set up a BIM project's worksets, naming conventions, and linked models for a multi-person team, and resolve a worksharing conflict [Usage] • Evaluate a BIM project's file organization and worksharing setup for consistency with its naming conventions and its ability to support concurrent editing [Assessment]
Readings : [HM15]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [KD15]	

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

[Eas+11] Chuck Eastman et al. *BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors*. 2nd. Wiley, 2011.

[HM15] Brittany Hardin and David McCool. *BIM and Construction Management: Proven Tools, Methods, and Workflows*. 2nd. Wiley, 2015.

[KD15] Eddy Krygiel and Greg Demchak. *Mastering Autodesk Revit Architecture 2016*. 1st. Sybex, 2015.

[Sti21] Daniel John Stine. *Autodesk Revit 2022 for Architecture*. 1st. SDC Publications, 2021.

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

1. COURSE

AR1D1. Design Studio I (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1D1. Design Studio I
2.2 Semester	:	1st Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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

Design Studio I: Foundations is the student's first encounter with the studio culture that defines architectural education: short, intensive design exercises, physical model-making, pin-up and desk-crit critique, and iterative revision. Starting from purely abstract explorations of space, form, and light, the course progressively scales up these operations into the student's first habitable proposal – a minimal pavilion or similar small object-to-space exercise – while introducing the orthographic and three-dimensional drawing conventions needed to communicate spatial ideas. This course has no prerequisite within the Design Studio sequence and is the foundation for Design Studio II (AR1D2).

5. GOALS

- Identify and apply the fundamental spatial, formal, and compositional concepts – space, form, light, program, and precedent – that underpin architectural design.
- Practice the iterative design process (brief analysis, ideation, model-making, critique, and revision) through short design exercises developed under a studio pin-up/desk-crit culture.
- Produce orthographic drawings (plans, sections, elevations) that correctly apply line-weight and drawing-set conventions.
- Build and present physical study and presentation models of a design proposal, from massing studies to a finished model.

6. COMPETENCES

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

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

7. TOPICS

Unit 1: Foundations of Architectural Design (10 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Space, form, and order: positive and negative space, enclosure, threshold, spatial sequence, hierarchy, scale, and proportion as fundamental architectural design concepts • Architectural elements and their spatial roles: wall, floor, ceiling, and roof as enclosure; column, beam, and slab as structure • Composition and formal operations: symmetry, asymmetry, balance, rhythm, repetition, modulation, contrast, and tension as tools of architectural formal organization • Light and shadow as design media: natural light quality by orientation and time, shadow and material surface perception, light as spatial modifier - compression, expansion, focus • Embodied perception of space: scale as bodily experienced rather than drawn, movement and kinesthetic sequence through space, and the visual, acoustic, and tactile engagement that shapes how a space is actually inhabited and felt • Materiality as an experiential design medium: texture, weight, surface finish, and color, and the atmosphere and character that material choice and craft give to a space, as distinct from a material's structural or technical properties • Program and spatial organization: functional zoning and bubble diagrams, circulation systems (horizontal, vertical, service), spatial hierarchy, and programmatic sequence • Precedent study methods: formal analysis frameworks for canonical architectural works; reading plans, sections, and photographs as design intelligence	• Identify and describe the key spatial, perceptual, material, and compositional concepts that constitute the foundations of architectural design [Familiarity] • Apply foundational design principles - space, perception, materiality, light, program, and composition - in the development of a spatial architectural proposal [Usage] • Evaluate a design or building project for the quality of its spatial organization, formal coherence, perceptual experience, material expression, and use of light and program, identifying strengths and areas for improvement [Assessment]
Readings : [**Ching2015**], [**Unwin2014**]	

Unit 2: Design Process and Creative Methods (16 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Brief analysis and problem framing: decomposing a design brief into spatial, functional, contextual, and performative requirements; identifying constraints and opportunities • Architectural site analysis: solar orientation and sun path, prevailing wind and microclimate, topography and drainage, views and visual axes, vehicular and pedestrian access, surrounding urban fabric and context, and existing site constraints (easements, setbacks, utilities) as inputs to a design concept • Design-criteria formulation: translating client and user requirements, site-analysis findings, and regulatory constraints into a prioritized, measurable set of functional, spatial, environmental, and budgetary criteria used to generate and evaluate design alternatives • Ideation and concept development: sketching, diagramming, and collage as tools to explore spatial ideas; arriving at the parti (partido arquitectónico) – the single organizing idea that drives a design – and translating it into spatial and formal proposals • Physical model-making as a design tool: study models for spatial exploration, massing studies, sectional models, and the role of making in discovering design solutions • Iterative design and critique: pin-up and desk critique culture, receiving and integrating feedback, revision cycles, and developing design judgment through reflection • Design narrative and argumentation: articulating design intent verbally and graphically, building a coherent design argument, and presenting spatial proposals persuasively • Collaborative and interdisciplinary design processes: co-design with engineers, landscape architects, and community stakeholders	• Describe the stages of an iterative architectural design process, from brief and site analysis through design-criteria formulation, concept development (parti), revision, and final proposal [Familiarity] • Apply site analysis, design-criteria formulation, and systematic ideation and iterative critique methods to develop and refine a spatial architectural proposal in response to a design brief [Usage] • Evaluate the coherence and effectiveness of a design process, including the quality of concept articulation, iteration, and responsiveness to critique [Assessment]
Readings : [**Lawson2005**], [**Unwin2014**]	

Unit 3: Orthographic Drawing and Conventions (14 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 : [**ChingGraphics2014**]	

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

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.

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

1. COURSE

MA100. Basic Mathematics (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	MA100. Basic Mathematics
2.2 Semester	:	1st Semester.
2.3 Credits	:	5
2.4 Hours	:	3 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

The Basic Mathematics course is mandatory and provides the conceptual tools necessary for logical reasoning and problem solving. The course ranges from propositional logic and set theory to the study of real numbers, complex numbers, polynomials, and matrices. These concepts are fundamental for developing the abstraction and mathematical formalization skills required in the later stages of the Computer Science program.

5. GOALS

- Develop logical reasoning and critical thinking skills through the use of formal languages.
- Understand and apply the properties of number systems (real and complex) in problem solving.
- Manipulate polynomial and matrix structures to solve systems of equations and interpret results.
- Introduce basic concepts of statistics and probability for data analysis.

6. COMPETENCES

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

7. TOPICS

Unit 1: Logic and Sets (16 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Propositional logic: Connectives, truth tables, and validity. • Logical-mathematical quantifiers. • Set theory: Operations, relations, and functions. • Families of sets and Cartesian product.	• Formalize natural language statements into propositional language [Familiarizarse]. • Operate with sets using algebraic laws and Venn diagrams [Usar]. • Prove basic properties of sets and logical relations [Evaluar].
Readings : [Lip91], [Roj95]	

Unit 2: Number Systems (16 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• The real number system: Field and order axioms. • Mathematical induction and Newton's binomial theorem. • Complex numbers: Binomial, polar, and exponential forms. • Roots of complex numbers and De Moivre's theorem.	• Identify the algebraic structure of real and complex numbers [Familiarizarse]. • Apply the principle of mathematical induction in proofs of summations [Usar]. • Solve equations in the complex number field using various representations [Evaluar].
Readings : [Gen85], [Pin73]	

Unit 3: Polynomials and Matrices (16 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Polynomials: Division algorithm and roots of polynomials. • Matrices: Types, operations, and determinants. • Inverse matrix and rank of a matrix. • Systems of linear equations: Gauss-Jordan method.	• Recognize the structure of polynomial rings and matrix algebra [Familiarizarse]. • Use elementary row operations to calculate the inverse of a matrix [Usar]. • Model and solve systems of linear equations applied to contextual problems [Evaluar].
Readings : [Gen84], [Roj95]	

Unit 4: Statistics and Probability (16 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Descriptive statistics: Measures of central tendency. • Dispersion measures and graphical representation. • Probability concepts: Sample space and events. • Conditional probability and independence.	• Describe data sets using basic statistical indicators [Familiarizarse]. • Calculate probabilities of simple and compound events in random experiments [Usar]. • Interpret statistical results for decision making in scientific environments [Evaluar].
Readings : [Pet05]	

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

[Pin73] Álvaro Pinzón. *Conjuntos y estructuras*. Blaisdell Publishing Company, 1973.

[Gen84] Enzo Gentile. *Notas de álgebra*. Editorial Universitaria de Buenos Aires, 1984.

[Gen85] Enzo Gentile. *Aritmética Elemental*. Colección de Monografías Científicas Ser, 1985.

[Lip91] Seymour Lipschutz. *Teoría de conjuntos y temas afines*. McGraw-Hill, 1991.

[Roj95] Armando Rojo. *Álgebra I*. El Ateneo, 1995.

[Pet05] John Peterson. *Matemática básica*. Prentice-Hall, 2005.

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

1. COURSE

MA111. Calculus I (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	MA111. Calculus I
2.2 Semester	:	1st Semester.
2.3 Credits	:	5
2.4 Hours	:	3 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

This course introduces the fundamental concepts of differential calculus of single-variable real functions. It provides the mathematical foundations necessary for analyzing change and motion in science and engineering, developing logical reasoning through the study of limits, continuity, and derivatives.

5. GOALS

- Understand the fundamental concepts of limits and continuity.
- Master differentiation techniques for algebraic and transcendental functions.
- Apply derivatives to solve optimization problems and analyze rates of change.
- Develop a rigorous approach to the formal definition of a derivative.

6. COMPETENCES

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

7. TOPICS

Unit 1: Limits and Continuity (20 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Limits and continuity of single-variable functions	• Interpret the concept of limit and continuity of a function and its relevance to modeling the behavior of architectural systems near a point [Familiarity]
Readings : [Ste16], [LE18], [TWH14]	

Unit 2: Differential Calculus (20 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Derivatives and rules of differentiation	• Apply differentiation rules to find rates of change and optimize architectural design parameters [Usage] • Formulate and solve optimization problems for architectural systems using differential calculus [Assessment]
Readings : [Ste16], [LE18], [TWH14]	

Unit 3: Integral Calculus (10 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• The Fundamental Theorem of Calculus • Integration techniques including substitution and parts • Architectural applications of integration: areas, volumes, centroids, and moments of inertia	• State and explain the Fundamental Theorem of Calculus [Familiarity] • Calculate definite integrals arising from architectural problems such as work, fluid pressure, and heat transfer [Usage]
Readings : [Ste16], [LE18], [TWH14]	

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

[TWH14] George B. Thomas, Maurice D. Weir, and Joel Hass. *Cálculo de una variable*. 13th. Pearson, 2014.

[Ste16] James Stewart. *Cálculo de una variable: Trascendentes tempranas*. 8th. Cengage Learning, 2016.

[LE18] Ron Larson and Bruce H. Edwards. *Cálculo*. 10th. Cengage Learning, 2018.

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

1. COURSE

EG163. Communication I (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG163. Communication I
2.2 Semester	:	1st Semester.
2.3 Credits	:	4
2.4 Hours	:	4 HT;
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

Comunicación I es el primer curso de la línea de comunicación del Área de Estudios Generales, de naturaleza teórico-práctica y carácter obligatorio. Desarrolla la competencia comunicativa del estudiante para que sea capaz de aplicar técnicas y herramientas de expresión oral, enfatizando en la lectura y comprensión de textos literarios y no literarios, así como en habilidades esenciales para la escritura y producción de textos sencillos, aplicando la normatividad vigente del español. Cubre la comunicación humana y sus elementos, las técnicas y estrategias de expresión oral en disertaciones breves y el discurso, la determinación y el análisis personal del nivel de comprensión de lectura, y la producción de textos sencillos y cotidianos, ensayos breves y documentos administrativos de uso común.

5. GOALS

- Identificar los elementos y niveles del proceso de comunicación humana, reconociendo la realidad lingüística del Perú.
- Aplicar técnicas y estrategias de expresión oral en disertaciones breves y discursos académicos.
- Desarrollar estrategias de comprensión lectora para el análisis de textos literarios y no literarios.
- Producir textos sencillos, ensayos breves y documentos administrativos de uso frecuente con corrección idiomática.

6. COMPETENCES

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

7. TOPICS

Unit 1: (25 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• La comunicación humana: concepto y elementos que intervienen en el proceso de comunicación. • Formas de comunicación, cualidades de una comunicación adecuada, comunicación efectiva y barreras de la comunicación. • Naturaleza y propiedades universales del lenguaje. Funciones del lenguaje. • Niveles de la lengua, diversificación del español en el Perú, lenguas peruanas, bilingüismo y realidad lingüística del Perú. • Niveles, técnicas y estrategias de lectura. Análisis y crítica en la lectura.	• Explica el concepto de comunicación humana y esquematiza los elementos que intervienen en el proceso comunicativo. [Familiarizarse]. • Establece las principales cualidades de una comunicación adecuada y reconoce sus barreras. [Usar]. • Reconoce la importancia de la lengua estándar y culta, y la realidad lingüística y el bilingüismo del Perú, para su formación académica. [Usar]. • Lee y comprende textos, desarrollando un cuestionario como evidencia de comprensión y análisis textual. [Usar].
Readings : [**ADUNI2003**], [**Fonseca2011**]	

Unit 2: (35 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Oratoria: base teórica, técnicas y finalidad. • Corporalidad y comunicación: cualidades del orador, estilo y posturas corporales. El discurso: estructura y contenido. • Propiedad léxica. El texto expositivo oral. Técnicas y recursos para la exposición oral y académica. • Las dinámicas grupales y el trabajo en equipo: concepto, tipos y proceso de formación de grupos. • Tildación enfática y de palabras compuestas. Ortografía de la oración: signos de puntuación.	• Elabora y expone un discurso formal ante sus compañeros, aplicando las bases teóricas y técnicas de la oratoria. [Usar]. • Identifica las propiedades de una buena elocución y realiza ejercicios para mejorar la vocalización, la dicción y la corporalidad en la exposición oral. [Usar]. • Planifica y dirige una exposición académica utilizando recursos multimedia. [Usar]. • Planifica el desarrollo de dinámicas grupales (panel, foro, debate, mesa redonda, simposio, seminario) sobre un tema actual. [Usar]. • Aplica las reglas de tildación enfática, tildación de palabras compuestas y ortografía de la oración (signos de puntuación) en prácticas dirigidas y calificadas. [Usar].
Readings : [**Faccini2018**], [**RAE2012**]	

Unit 3: (30 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• El texto: tipos, formatos y estructuras. Texto continuo, discontinuo, mixto y múltiple. • Textos argumentativos y descriptivos. El texto expositivo. • El párrafo: características y clasificación (introducción, desarrollo y conclusión). • Redacción: concepto, importancia y habilidades para una óptima redacción. Importancia de la redacción en el campo ocupacional del arquitecto. • Documentos administrativos: solicitud, memorial, oficio, carta, informe técnico, memorando, acta y curriculum vitae.	• Distingue los tipos, formatos y estructuras de texto (continuo, discontinuo, mixto y múltiple) a través de prácticas calificadas. [Usar]. • Analiza y reconoce la estructura de un texto expositivo, y redacta un ensayo breve sobre un tema social de coyuntura aplicando correctamente las reglas ortográficas y gramaticales. [Usar]. • Redacta los párrafos de introducción, desarrollo y conclusión de un texto expositivo. [Usar]. • Aplica las características de una buena redacción y las normas ortográficas en la elaboración de textos administrativos (solicitud, memorial, oficio, carta, informe técnico, memorando, acta, curriculum vitae). [Usar].
Readings : [**Godoy2012**], [**GonzalezGarcia2023**]	

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

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

1. COURSE

EG164. Digital Competencies Development (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG164. Digital Competencies Development
2.2 Semester	:	1st Semester.
2.3 Credits	:	3
2.4 Hours	:	1 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

Desarrollo de Competencias Digitales pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórico-práctica. Tiene como propósito desarrollar las competencias digitales de los estudiantes en las dimensiones de información, comunicación y creación de contenido, de modo que puedan utilizar de manera más efectiva los recursos que ofrecen las tecnologías de información y comunicación y aplicarlas en sus tareas académicas. Cubre la búsqueda, organización y almacenamiento de información; el uso de herramientas de comunicación y trabajo colaborativo en línea; y la creación de contenido mediante procesadores de texto, presentaciones y hojas de cálculo, con énfasis en la ética informática.

5. GOALS

- Demostrar manejo de las TIC para la búsqueda, organización y almacenamiento de información.
- Aplicar herramientas de comunicación y trabajo colaborativo en línea con criterios de seguridad y ética informática.
- Crear contenido digital (textos, presentaciones y hojas de cálculo) utilizando herramientas avanzadas, reconociendo su importancia en el trabajo académico.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

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

7. TOPICS

Unit 1: (20 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Búsqueda de información: principios básicos, motores de búsqueda y operadores booleanos. • Organización y almacenamiento digital: estructura de carpetas y etiquetado. Hosting y servicios de alojamiento de información. • Herramientas avanzadas de navegadores: funciones avanzadas de personalización. Seguridad y privacidad digital. • Herramientas de información en línea: bases de datos académicas, repositorios y bibliotecas virtuales. Evaluación de fuentes especializadas. • Uso de inteligencia artificial para la búsqueda de información: elaboración de prompts y uso responsable.	• Utiliza los diferentes buscadores digitales según criterios de eficiencia, coherencia y calidad, aplicando operadores booleanos. [Usar]. • Comprende el uso práctico de plataformas de almacenamiento en la nube y ejecuta simulaciones de organización de archivos de proyectos. [Usar]. • Instala y configura extensiones de navegadores para mejorar la productividad y la seguridad digital. [Usar]. • Integra herramientas de inteligencia artificial de manera responsable y ética en la búsqueda de información, presentando un proyecto digital integrador. [Usar].
Readings : [**Aznar2014**], [**Gonzalez2017**]	

Unit 2: (28 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Comunicación digital: fundamentos. Redes sociales y transacciones en línea. • El trabajo colaborativo vs. el trabajo en grupo de manera aislada. Plataformas para reuniones virtuales (Google Meet, Zoom, Teams). Calendarios y carpetas colaborativas. • Blogs, foros y wikis para compartir conocimiento. Moderación y gestión de comunidades virtuales. • Gestión del conocimiento en línea. Comunicación síncrona y asíncrona: diferencias, ventajas, protocolos y etiqueta digital. • Transacciones en línea: seguridad, fundamentos de protección en transacciones online y análisis de plataformas de pago.	• Configura perfiles profesionales en plataformas digitales y realiza simulaciones de networking en línea. [Usar]. • Organiza y conduce reuniones virtuales, creando, agendando y asignando tareas para trabajos colaborativos. [Usar]. • Gestiona de manera efectiva blogs, foros y wikis, moderando y compartiendo conocimiento en comunidades virtuales. [Usar]. • Redacta y organiza correos electrónicos formales, aplicando protocolos y etiqueta digital en la comunicación síncrona y asíncrona. [Usar]. • Analiza plataformas de pago y simula transacciones seguras, aplicando criterios de seguridad digital. [Usar].
Readings : [**Herrera2018**], [**Jimenez2019**]	

Unit 3: (24 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Dominio del procesador de texto. Uso avanzado en la elaboración de informes y documentos técnicos. La redacción clara y precisa en proyectos arquitectónicos. • Creación de presentaciones digitales I: herramientas y principios básicos (PowerPoint, Google Slides, Canva). • Creación de presentaciones digitales II: opciones avanzadas, técnicas de animación, transiciones, elementos interactivos y storytelling visual aplicado a la arquitectura. • Uso de hojas de cálculo para proyectos: funcionalidades en la gestión de presupuestos, análisis de datos y cálculos estructurales. • Ética informática y propiedad intelectual: principios éticos en la creación y uso de contenido digital, derechos de autor y uso responsable de la información.	• Revisa y edita de manera colaborativa documentos técnicos, ejercitando el uso avanzado del procesador de texto. [Usar]. • Diseña diapositivas incorporando multimedia y estructuras narrativas, aplicando herramientas y principios básicos de presentaciones digitales (PowerPoint, Google Slides, Canva). [Usar]. • Aplica herramientas avanzadas de presentaciones, incluyendo animaciones, transiciones y storytelling visual aplicado a la arquitectura. [Usar]. • Crea y manipula hojas de cálculo para la gestión de presupuestos, análisis de datos y cálculos estructurales de manera colaborativa. [Usar]. • Analiza principios éticos en la creación y uso de contenido digital, y los derechos de autor y propiedad intelectual. [Usar].
Readings : [**Paredes2017**], [**Castillo2018a**]	

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

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

1. COURSE

EG165. Strategies for Autonomous Learning (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG165. Strategies for Autonomous Learning
2.2 Semester	:	1st Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Estrategias para el Aprendizaje Autónomo pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito que los estudiantes desarrollen habilidades y estrategias de aprendizaje que les permitan desempeñarse como aprendices autónomos, haciendo uso eficiente del tiempo y de los recursos de información disponibles para mejorar los resultados de aprendizaje en los cursos de su carrera y lograr una adaptación exitosa a la vida universitaria. Cubre el autodiagnóstico de estrategias de aprendizaje y habilidades para el estudio, los enfoques y estilos de aprendizaje, las estrategias de aprendizaje (cognitivas, afectivas, metacognitivas) y las herramientas y técnicas para mejorarlas.

5. GOALS

- Analizar aspectos importantes de la universidad, la ley universitaria y el conocimiento y la investigación científica en la universidad.
- Analizar la importancia de las estrategias, enfoques y estilos de aprendizaje, y las herramientas para mejorarlas.
- Comprender la importancia de la elaboración de trabajos científicos y académicos en la vida universitaria.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

AG-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Familiarity)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• La universidad: orígenes, conceptualización y funciones. • La Ley Universitaria Nº 30220. • La SUNEDU. La universidad comprometida con los Objetivos de Desarrollo Sostenible. • El conocimiento y la investigación científica en la universidad.	• Describe aspectos importantes del origen de las universidades en el mundo y en el Perú, y analiza su importancia en forma grupal e individual. [Familiarizarse]. • Analiza los aspectos importantes de la nueva ley universitaria (Ley Nº 30220). [Familiarizarse]. • Identifica la importancia de la SUNEDU en el Perú y de las universidades en los objetivos de desarrollo sostenible. [Familiarizarse]. • Analiza la importancia del conocimiento y la investigación científica en la universidad. [Familiarizarse].
Readings : [**Educacion2014**], [**RidderSymoens1994**]	

Unit 2: (21 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Autodiagnóstico de estrategias de aprendizaje y habilidades para el estudio. Teorías del aprendizaje. • Enfoques de aprendizaje. • Estilos de aprendizaje. • Estrategias de aprendizaje: concepto, tipos (cognitivas, afectivas, metacognitivas). • Herramientas y técnicas para mejorar las estrategias de aprendizaje.	• Identifica estrategias de aprendizaje y habilidades para el estudio, y reconoce las principales teorías del aprendizaje (conductista, cognitivista, constructivista, sociocultural y aprendizaje significativo). [Usar]. • Identifica y analiza los diversos enfoques de aprendizaje para el proceso de aprendizaje. [Usar]. • Identifica y analiza los estilos de aprendizaje a nivel grupal e individual. [Usar]. • Identifica y analiza las diversas estrategias de aprendizaje (cognitivas, afectivas, metacognitivas) en el proceso de enseñanza. [Usar]. • Identifica las diversas herramientas y técnicas para mejorar las estrategias de aprendizaje. [Usar].
Readings : [**AguileraReyes2017**], [**Carrasco2004**]	

Unit 3: (18 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Proceso para la elaboración de trabajos científicos y académicos: la monografía, informes de investigación y trabajos de investigación. • Estructura de la monografía. • Estructura del informe de investigación. • Estructura de los trabajos de investigación.	• Analiza y describe el proceso para la elaboración de trabajos científicos y académicos: la monografía, los informes de investigación y los trabajos de investigación. [Usar]. • Identifica las partes y elabora una monografía a nivel grupal. [Usar]. • Identifica las partes y elabora un informe de investigación a nivel individual. [Usar]. • Identifica las partes y elabora un trabajo de investigación, resolviendo el cuestionario de unidad. [Usar].
Readings : [**AnderEgg2017**], [**Day2005**]	

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

UNIVERSIDAD PRIVADA DE TACNA

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

1. COURSE

EG166. Basic Mathematics (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG166. Basic Mathematics
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

Matemática Básica pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórico-práctica. Tiene como propósito desarrollar el pensamiento lógico, la conexión matemática y la resolución de problemas en situaciones del contexto real y aplicado a la arquitectura. Comprende la teoría de conjuntos y sus operaciones, el sistema de números reales, ecuaciones lineales y cuadráticas con dos y tres variables, inecuaciones lineales y cuadráticas, funciones, proporcionalidad, semejanza de triángulos, área de figuras planas y su ubicación en el plano cartesiano, lógica proposicional y esquemas lógicos.

5. GOALS

- Aplicar principios fundamentales de teoría de exponentes, lógica proposicional y teoría de conjuntos en la resolución de casos aplicados a la arquitectura.
- Analizar y resolver ecuaciones e inecuaciones, y problemas con sistemas de ecuaciones, aplicados a la arquitectura.
- Interpretar y aplicar conceptos fundamentales de geometría analítica a la resolución de problemas de áreas, perímetros y figuras aplicados a la arquitectura.

6. COMPETENCES

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

7. TOPICS

Unit 1: (30 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Conjunto de números reales. Teoría de exponentes: propiedades. • Racionalización. Simplificación de expresiones irracionales. • Lógica proposicional: definiciones, lenguaje proposicional, interpretación de operadores. • Teoría de conjuntos: definición, notación, gráfica, pertenencia, inclusión. Producto cartesiano. • Productos notables: propiedades.	• Aplica propiedades de la teoría de exponentes en la simplificación de expresiones y resuelve ejercicios con números irracionales aplicando racionalización. [Usar]. • Comprende las nociones fundamentales de la lógica proposicional e identifica los conectores lógicos, aplicando correctamente el lenguaje proposicional en la resolución de ejercicios y problemas. [Usar]. • Identifica las clases y realiza operaciones aplicando propiedades de la teoría de conjuntos, incluyendo el producto cartesiano. [Usar]. • Conoce las propiedades de productos notables y las aplica en la simplificación de expresiones algebraicas. [Usar].
Readings : [**VeneroBaldeon2007**], [**Lumbreras**]	

Unit 2: (42 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Ecuaciones: definición, planteamiento y resolución de casos con ecuaciones lineales. • Ecuaciones cuadráticas: desarrollo de ejercicios y problemas de ecuaciones aplicados a la arquitectura. • Sistema de ecuaciones: métodos de resolución. • Inecuaciones: definición, teoremas, resolución de ejercicios de desigualdades lineales. • Aplicaciones de ecuaciones e inecuaciones en arquitectura.	• Resuelve ecuaciones lineales con una variable y problemas aplicando propiedades de las ecuaciones relacionados con su carrera. [Usar]. • Resuelve ecuaciones cuadráticas aplicando factorización, completando cuadrados y la fórmula general. [Usar]. • Evalúa los métodos de resolución de sistemas de ecuaciones e interpreta las soluciones en el desarrollo de ejercicios aplicados a la arquitectura. [Usar]. • Define e interpreta la solución de desigualdades de primer grado, cuadráticas y racionales con una incógnita. [Usar]. • Traduce e interpreta la expresión verbal al lenguaje algebraico para la resolución de problemas de ecuaciones e inecuaciones aplicados a la arquitectura. [Usar].
Readings : [**ArauzoB**], [**Maltsev**]	

Unit 3: (36 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Introducción a la geometría analítica: punto, recta y polígonos en el plano cartesiano. • La recta: ángulo de inclinación, pendiente, ecuación de la recta, distancia entre dos puntos, punto medio y división de segmentos. • La parábola: elementos, propiedades, clasificación y ecuación. • Perímetro y área de figuras poligonales en 2D, descripción de lotes por orientación magnética y por ubicación. • Perímetro y área de cilindros y prismas aplicados a la arquitectura.	• Conoce y aplica correctamente la teoría de geometría analítica (punto, recta y polígonos en el plano cartesiano) para resolver ejercicios y problemas de áreas de polígonos. [Usar]. • Utiliza los conceptos de la recta (ángulo de inclinación, pendiente, distancia entre dos puntos, punto medio) en la resolución de ejercicios y problemas. [Usar]. • Identifica y grafica la ecuación de la parábola, resolviendo problemas de aplicación en casos prácticos de arquitectura. [Usar]. • Realiza cálculos de área y perímetro de figuras poligonales en 2D, cilindros y prismas, aplicados a la arquitectura. [Usar].
Readings : [**Leithold**], [**BallesterJulioAlbert**]	

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

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

1. COURSE

AR1B2. Parametric Modeling and Generative Design (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1B2. Parametric Modeling and Generative Design
2.2 Semester	:	2nd Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR1B1. Introduction to BIM. (1st Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Parametric Modeling and Generative Design is the second course of the obligatory BIM I-X sequence, requiring Introduction to BIM (AR1B1) as a prerequisite. Where AR1B1 establishes object-based authoring, LOD, and model-derived documentation, this course extends that authoring skillset into parametric and generative territory: building custom parametric families and components, driving them with visual scripting (Dynamo, Grasshopper-to-Revit), and coupling a parametric model to a performance metric to generate and compare design options (generative design/optioneering). A third unit grounds this computational work physically, taking a digital model through CNC, laser-cutting, 3D-printing, or robotic-fabrication workflows to produce a prototype – the KU this course is the first to actually use. The recurring software-practicum unit anchors all of this in guided, certification-aligned exercises specific to the course's parametric/generative tool focus, preparing students for the multidisciplinary model coordination they will take on next in Multidisciplinary Coordination (AR2B1).

5. GOALS

- Author parametric BIM families and components, and use visual-scripting tools (Dynamo, Grasshopper-to-Revit) to automate repetitive modeling and data-extraction tasks.
- Set up and run generative-design/optioneering workflows that couple a parametric model to a quantifiable performance metric, generating multiple design options for comparison.
- Interpret multi-objective optimization trade-offs (Pareto fronts) to select a justified design option from a generated set.
- Translate digital models into physical prototypes through CNC milling, laser cutting, 3D printing, and robotic-fabrication workflows, documenting file preparation and machine parameters.
- Build toward a cumulative BIM-software practicum deliverable through guided, certification-aligned exercises in parametric authoring and generative-design tools.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

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

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

7. TOPICS

Unit 1: Parametric Modeling and Visual Scripting for BIM (24 hours)	
Competences Expected: AG-A06,AG-A07	
Topics	**Learning Outcomes**
• Parametric family and component authoring: creating custom BIM families with parametric constraints, formulas, and type/instance parameters (Revit families, ArchiCAD GDL objects) • Adaptive and generative components: adaptive component modeling for non-standard geometry, nested and shared parameters, and parametric array/pattern-based component placement • Visual programming for BIM automation: Dynamo and Grasshopper-to-Revit workflows for geometry generation, data extraction, and model auditing • Integrating computational design with BIM: round-tripping geometry between parametric-design environments and BIM authoring tools, and managing model complexity and file size	• Describe the difference between a standard BIM family or component and a parametric or adaptive one, and identify when visual scripting is an appropriate tool for a BIM modeling task [Familiarity] • Author a parametric family or component with meaningful parametric constraints, and use a visual-scripting tool to automate a repetitive BIM modeling or data-extraction task [Usage] • Evaluate a parametric BIM family or visual script for robustness, reusability, and appropriateness to the design problem it addresses [Assessment]
Readings : [Woo10]	

Unit 2: Generative Design and Optioneering (24 hours)	
Competences Expected: AG-A07,AG-A09	
Topics	**Learning Outcomes**
• Generating design option sets through parametric variation of a model's driving dimensions, and organizing them for systematic comparison • Performance-driven generative design: coupling a parametric model to a fitness metric (area efficiency, daylight, structural weight) via optimization plug-ins (Galapagos, Octopus) • Multi-objective optimization trade-offs: Pareto fronts for competing criteria, and interpreting optimization results for design decision-making	• Describe how generative design couples a parametric model to a performance metric to produce and compare design options [Familiarity] • Set up a parametric model and an optimization plug-in to generate a set of design options against a chosen performance metric [Usage] • Evaluate a generative-design option set for the validity of its performance metric and the appropriateness of the selected design option [Assessment]
Readings : [MA11]	

Unit 3: Digital Fabrication Output and CNC Toolpaths (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• CNC milling workflow: generating toolpaths from 3D models (roughing and finishing passes), selecting bits (end mill, ball nose), setting feeds and speeds, workpiece fixturing, • Laser cutting workflow: preparing vector files (DXF, AI), setting cut vs. etch parameters by material type (plywood, acrylic, cardboard), kerf compensation, • 3D printing workflow: STL/3MF file preparation, orientation for minimal supports, layer height, infill density, print bed adhesion, • Robotic fabrication basics: 6-axis robotic arm kinematics, toolpath generation (KUKA|prc, HAL for Grasshopper), end-effector design (spindle, extruder, gripper), • Post-processing of digitally fabricated parts: removing supports, sanding, painting, assembly of modular components, and the relationship between fabrication tolerances	• Describe the workflows for CNC milling, laser cutting, and 3D printing in architectural model-making and prototyping, including file preparation, machine parameter selection, [Familiarity] • Generate toolpaths for a laser cutter or CNC router from a 3D model or 2D vector file, fabricate a physical prototype, and document the process [Usage] • Evaluate the suitability of a digital fabrication method (CNC, laser, 3D print) for a specific architectural component or model, considering material, resolution, cost, [Assessment]
Readings : [Kol03]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [KRV23]	

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

[Kol03] Branko Kolarevic. *Architecture in the Digital Age: Design and Manufacturing*. 1st. Spon Press, 2003.

[Woo10] Robert Woodbury. *Elements of Parametric Design*. 1st. Routledge, 2010.

[MA11] Achim Menges and Sean Ahlquist. *Computational Design Thinking*. 1st. Wiley, 2011.

[KRV23] Eddy Krygiel, Phil Read, and James Vandezande. *Mastering Autodesk Revit 2024*. 1st. Sybex, 2023.

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

1. COURSE

AR1D2. Design Studio II (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1D2. Design Studio II
2.2 Semester	:	2nd Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR1D1. Design Studio I. (1st Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio II: Single-Family Housing is the student's first complete, habitable design project, building on the spatial, formal, and representational foundations developed in Design Studio I (AR1D1, prerequisite). Students design a single-family house on a real lot, resolving a full domestic program – living, sleeping, service, and outdoor spaces – while responding to accessibility requirements, daylight and thermal comfort, and the specific conditions of the site. The studio introduces the residential structural systems – confined masonry, timber framing, and reinforced adobe – most commonly used to build a single-family house in Peru. It continues the pin-up/desk-crit critique culture and introduces the communication skills (design boards, physical models, verbal presentation) needed to defend a complete design proposal. This course is the foundation for Design Studio III (AR1D3).

5. GOALS

- Apply human-centered and universal design principles – including accessibility standards – to the design of a complete domestic program on a real lot.
- Resolve the functional, spatial, and site-responsive requirements of single-family housing, from zoning diagrams to a developed floor plan.
- Design building apertures and envelope strategies that provide adequate daylight and passive thermal comfort for the dwelling.
- Select and detail an appropriate residential structural system – confined masonry, timber framing, or reinforced adobe – for the house, considering material availability, cost, and seismic performance.
- Iterate the design proposal through a full studio critique cycle and communicate the final design through boards, models, and verbal presentation.

6. COMPETENCES

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

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A11) Demonstrates knowledge of the physical problems and technologies that allow buildings to provide internal comfort and protection within environmental parameters. (Usage)

AG-A15) Understands the relationship between people, buildings, and their environment, and the need to relate buildings and spaces to human scale and needs. (Usage)

7. TOPICS

Unit 1: Human-Centered and Inclusive Design (8 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Universal design principles: equitable use, flexibility in use, simple and intuitive operation, perceptible information, tolerance for error, low physical effort, and size • Accessibility standards and codes: ADA, ISO 21542, and regional building codes for accessible routes, ramps, elevators, restrooms, signage, and emergency egress • Spatial user experience: wayfinding, legibility, sensory richness, acoustic comfort, and the design of spaces that support diverse activities, ages, and abilities • Participatory design processes: engaging future users and communities in defining spatial needs; co-design workshops, interviews, and community mapping as design tools	• Describe the principles of universal design and inclusive architecture and explain how they translate into spatial and technical design decisions [Familiarity] • Apply universal design principles and accessibility standards to develop an architectural design that accommodates the full spectrum of human ability, age, and cultural background [Usage] • Evaluate a building or public space design for inclusivity and accessibility, identifying barriers and proposing design modifications to improve equity and user experience [Assessment]
Readings : [**Neufert2012**]	

Unit 2: Residential and Vernacular Structural Systems (8 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Confined masonry (albañilería confinada): masonry walls confined by cast-in-place reinforced-concrete tie-columns and tie-beams, its seismic behavior and failure modes, and its role as Peru's dominant residential construction system under RNE Norma E.070 • Timber structural systems: heavy-timber post-and-beam framing, light wood framing (platform framing), mass timber (CLT, glulam), and the connections that distinguish each system's load path and seismic behavior • Reinforced and improved adobe (adobe mejorado): seismic retrofitting of earthen walls with geogrid/geomesh, cane (caña), or wire mesh reinforcement to mitigate the brittle failure of plain adobe, per Peru's RNE Norma E.080	• Identify confined masonry, timber, and reinforced earthen construction as structural systems, and describe their seismic behavior, failure modes, and appropriate use contexts [Familiarity] • Select and detail an appropriate residential structural system - confined masonry, timber framing, or reinforced adobe - for a single-family house, considering material availability, cost, and seismic performance [Usage] • Evaluate a single-family house's structural system for seismic adequacy and constructability, identifying code-compliance gaps under RNE Norma E.070 or E.080 as applicable [Assessment]
Readings : [**FriedmanHousing2013**]	

Unit 3: Housing and Residential Environments (12 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Housing typologies: single-family detached, row house, courtyard building, walk-up apartment, point tower, slab block, double-loaded corridor, • Affordable housing strategies: inclusionary zoning, density bonuses, cross-subsidization, public-private partnerships, community land trusts (CLTs), and the financial • Housing quality and dweller control: orientation for sunlight and ventilation, unit deepth to window ratio, privacy thresholds (distance to opposite windows), acoustic separation • Mixed-income and social mix housing: fostering social interaction, avoiding stigma of large public housing projects (Pruitt-Igoe lessons), • Housing policy frameworks: Vienna's social housing model, Singapore's public housing, Chilean housing subsidies,	• Identify the principal housing typologies and their urban density contributions, and describe the design qualities that distinguish high-quality residential environments from poorly designed ones [Familiarity] • Design a housing block at the neighborhood scale, specifying building typology mix, dwelling unit orientation and ventilation strategy, [Usage] • Evaluate a housing project for quality of life, affordability, and urban integration, using indicators such as floor-to-ceiling height, access to light [Assessment]
Readings : [**Neufert2012**], [**FriedmanHousing2013**]	

Unit 4: Daylighting and Visual Comfort (8 hours)	
Competences Expected: AG-A11	
Topics	**Learning Outcomes**
• Daylight performance metrics: daylight factor (DF), spatial daylight autonomy (sDA), annual sunlight exposure (ASE), useful daylight illuminance (UDI), and glare indices (DGP, DGI) • Aperture design for daylight: window-to-wall ratio (WWR), head height, sill height, clerestories, sawtooth roofs, light shelves, • Shading integration for glare and cooling: fixed (overhangs, fins, louvers), operable (roller shades, venetian blinds, screens), • Daylight simulation tools: climate-based modeling (Radiance, DIVA, ClimateStudio, Ladybug Tools); annual simulation for LEED and other certification credits • Electric lighting integration: daylight harvesting controls (dimming, stepped switching), task-ambient lighting strategies,	• Describe the principal daylight performance metrics (sDA, ASE, UDI) and explain how they inform aperture and shading design decisions [Familiarity] • Design and simulate a daylighting strategy for a building facade or roof aperture, iterating on WWR, orientation, and shading to meet defined sDA and ASE targets [Usage] • Evaluate a building's daylighting design from simulation outputs, identifying areas of glare or insufficient illuminance [Assessment]
Readings : [**BrownDeKay2001**]	

Unit 5: Thermal Comfort and Passive Systems (8 hours)	
Competences Expected: AG-A11	
Topics	**Learning Outcomes**
• Heat transfer mechanisms in buildings: conduction through assemblies (U-value), convection at surfaces and within cavities, and long-wave • Thermal comfort indices: PMV (predicted mean vote), PPD (predicted percentage dissatisfied), operative temperature, • Passive solar heating: direct gain (south-facing glazing + thermal mass), indirect gain (Trombe wall, water wall), isolated gain (sunspace) • Passive cooling strategies: night-flush ventilation, radiative cooling to the night sky, earth coupling (earth tubes, berming), evaporative cooling (roof ponds, fountains), • Thermal mass strategies: phase change materials (PCMs), exposed concrete or masonry for diurnal heat storage, and the placement of mass relative to insulation and solar gains	• Describe the heat transfer mechanisms that affect building thermal performance and explain the difference between predicted mean vote (PMV) and adaptive thermal comfort models [Familiarity] • Select and apply appropriate passive heating and cooling strategies for a building in a given climate, sizing apertures and mass to reduce predicted heating and cooling loads [Usage] • Evaluate a building's thermal design using simulation or hand calculation, identifying strategies that are underperforming [Assessment]
Readings : [**BrownDeKay2001**]	

Unit 6: Design Process and Creative Methods (10 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Brief analysis and problem framing: decomposing a design brief into spatial, functional, contextual, and performative requirements; identifying constraints and opportunities • Architectural site analysis: solar orientation and sun path, prevailing wind and microclimate, topography and drainage, views and visual axes, vehicular and pedestrian access, surrounding urban fabric and context, and existing site constraints (easements, setbacks, utilities) as inputs to a design concept • Design-criteria formulation: translating client and user requirements, site-analysis findings, and regulatory constraints into a prioritized, measurable set of functional, spatial, environmental, and budgetary criteria used to generate and evaluate design alternatives • Ideation and concept development: sketching, diagramming, and collage as tools to explore spatial ideas; arriving at the parti (partido arquitectónico) – the single organizing idea that drives a design – and translating it into spatial and formal proposals • Physical model-making as a design tool: study models for spatial exploration, massing studies, sectional models, and the role of making in discovering design solutions • Iterative design and critique: pin-up and desk critique culture, receiving and integrating feedback, revision cycles, and developing design judgment through reflection • Design narrative and argumentation: articulating design intent verbally and graphically, building a coherent design argument, and presenting spatial proposals persuasively • Collaborative and interdisciplinary design processes: co-design with engineers, landscape architects, and community stakeholders	• Describe the stages of an iterative architectural design process, from brief and site analysis through design-criteria formulation, concept development (parti), revision, and final proposal [Familiarity] • Apply site analysis, design-criteria formulation, and systematic ideation and iterative critique methods to develop and refine a spatial architectural proposal in response to a design brief [Usage] • Evaluate the coherence and effectiveness of a design process, including the quality of concept articulation, iteration, and responsiveness to critique [Assessment]
Readings : [**Lawson2005**]	

Unit 7: Architectural Communication and Presentation (8 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Design boards and panels: composition principles (grid, hierarchy, contrast, white space), integrating drawings (plan, section, elevation, axonometric, perspective), renderings • Architectural portfolio design: project selection (range of scales, stages, typologies), portfolio structure, narrative, captioning, • Physical model presentation: material choices (cardboard, foam, acrylic, 3D-printed, laser-cut), scale selection, level of detail, lighting • Verbal presentation of design: structuring a 5-10 minute design pitch (problem, concept, proposal, testing, conclusion), visual aids, responding to critique, • Architectural diagramming: circulation, program, structure, environmental performance, form generation, process	• Describe the key elements of effective architectural communication: narrative structure, visual hierarchy, appropriate level of detail, [Familiarity] • Produce a design presentation board (single panel) for an architectural project that integrates orthographic drawings, rendered views, diagrams, [Usage] • Evaluate a design portfolio or presentation for its communicative effectiveness, identifying strengths in narrative and visual clarity [Assessment]
Readings : [**ChingGraphics2014**]	

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

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

1. COURSE

AR2R1. Digital Drafting (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2R1. Digital Drafting
2.2 Semester	:	2nd 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	:	AR1R1. Geometry and Analog Drawing. (1st Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Digital Drafting is the second step of the Representation sequence, building directly on the orthogonal-projection and drafting-convention foundations from Geometry and Analog Drawing I (ARC1R1) and translating them into professional CAD/BIM software (Civil 3D, BricsCAD BIM). It introduces layer management, parametric/visual scripting, and generative-AI-assisted ideation – the production pipeline every later urbanism studio and the Topography course (ARC1T1) will assume students already have. Dedicated BIM authoring is left to the BIM course sequence (AR1B1 onward), which this course precedes.

5. GOALS

- Produce coordinated, layer-managed 2D technical drawings in CAD software for urban infrastructure, lots, and public-space plans.
- Build basic parametric/visual-scripting workflows to generate design variants of recurrent urban components (street sections, lot layouts).
- Use generative-AI tools for early-stage design ideation and image refinement, critically assessing their dimensional accuracy and authorship limitations against CAD-authored drawings.

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-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Assessment)

7. TOPICS

Unit 1: Computer-Aided Drafting (CAD) (32 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Digital 2D drafting in CAD software: layer organization and naming conventions (AIA CAD Layer Guidelines, US National CAD Standard), line types and line weights managed by layer, blocks and symbols as reusable CAD objects, external references (Xrefs) for coordinating consultant drawings, and plotting and sheet setup	• Identify the core conventions of digital 2D CAD drafting - layer organization, line types, blocks, and external references - and describe how they differ from hand-drafting conventions [Familiarity] • Produce a set of 2D CAD drawings for a small building using organized layers, blocks, and a consistent plotting and sheet setup [Usage] • Evaluate a set of CAD drawings for layer organization, line-type consistency, and block usage, identifying errors that would complicate plotting or consultant coordination [Assessment]
Readings : [Omu22]	

Unit 2: Parametric Design and Visual Programming (32 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Associative (parametric) modeling: defining geometry through relationships and rules rather than fixed coordinates; data flow graphs (inputs, components, outputs) • Data types in parametric models: numbers (integers, floats), points, vectors, curves, surfaces, breps, lists, data trees (graft, flatten, simplify), • Attractors and fields: using point attractors, curve attractors, or image sampling to modulate geometric parameters (size, rotation, density, offset) across a field • Parametric design families: creating a parameterized component (window, shading louver, structural node) whose geometry updates when driving dimensions or external data changes • Integrating external data: reading data from CSV/Excel files to drive geometry (site sun hours, program areas, cost data)	• Describe the principles of associative parametric modeling and explain the role of data trees, attractors, and external data in generating geometric variation [Familiarity] • Develop a parametric definition for a building facade panel system or structural grid that varies by orientation or solar exposure [Usage] • Evaluate a parametric definition for efficiency and clarity, identifying unnecessary components, redundant data structures, and opportunities for simplification or documentation [Assessment]
Readings : [Dav15]	

Unit 3: Generative AI for Architectural Design (32 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Text-to-image generation for design ideation: prompt engineering (style descriptors, architectural typologies, atmospheric qualities), iterative refinement, • Image-to-image and inpainting: using sketches or massing models as input for AI refinement (style transfer, detail generation) • Emerging text-to-3D generation: generating 3D models (mesh, point cloud, NeRF) from text or image prompts • Integrating generative AI into architectural workflows: early concept generation, client mood boards, presentation image enhancement (style transfer, background replacement • Limitations and risks of generative AI in architecture: lack of dimensional accuracy, non-constructible details, copyright	• Describe the capabilities and limitations of generative AI (text-to-image, image-to-image, text-to-3D) for architectural design ideation and visual communication [Familiarity] • Use a text-to-image AI tool to generate a set of conceptual design variations for an architectural project, then refine the best variation through image-to-image inpainting [Usage] • Evaluate AI-generated design images for their applicability to a real design problem, distinguishing inspirational material from constructible design content, [Assessment]
Readings : [CM22]	

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

[Dav15] Scott Davidson. *Grasshopper: Visual Scripting for Rhinoceros 3D*. 1st. self-published / McNeel, 2015.

[CM22] Matias del Campo and Sandra Manninger. *Neural Architecture: Design and Artificial Intelligence*. 1st. ORO Editions, 2022.

[Omu22] George Omura. *Mastering AutoCAD Civil 3D*. 1st. Sybex, 2022.

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

1. COURSE

ID101. Technical and professional English I (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	ID101. Technical and professional English I
2.2 Semester	:	2nd Semester.
2.3 Credits	:	2
2.4 Hours	:	1 HT; 2 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

English is the primary language of science, engineering, and technology worldwide. For computing and engineering students, mastering English means gaining direct access to technical documentation, research papers, and professional collaboration without translation barriers. This course builds foundational English skills using contexts drawn from computing systems, hardware, and the everyday work of engineers and scientists.

5. GOALS

- Acquire foundational English grammar structures applied to computing and engineering contexts.
- Identify and use technical vocabulary related to hardware, software, and scientific concepts.

6. COMPETENCES

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

7. TOPICS

Unit 1: Welcome to Computing (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Verb To Be: Affirmative, Negative, and Questions. • Personal Pronouns and Possessive Adjectives. • Number Expressions (1-100): Ports, addresses, and binary basics. • Social Expressions in academic and lab environments.	• By the end of the unit, students use the verb 'to be' to introduce themselves as computing students and describe basic properties of computing systems (e.g., "The processor is fast. It is a 64-bit CPU.").
Readings : [SJ02], [Cam06], [Mac99]	

Unit 2: Parts and Systems (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Possessive 's and Plural Nouns applied to components (the CPU's speed, the system's memory). • Hardware components and their relationships. • Adjective + Noun structures for technical descriptions. • Lab interactions: Asking about equipment and tools.	• Students describe computer hardware components and their relationships using possessives and noun phrases (e.g., "the motherboard's slots", "the server's processors").
Readings : [SJ02], [Cam06], [Mac99]	

Unit 3: How It Works (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Simple I (Third person: He/She/It) to describe processes. • Vocabulary: How programs, algorithms, and devices operate. • Telling the time and interpreting system clocks and schedules. • Verbs of operation: runs, compiles, executes, stores, transmits.	• Students explain how a program or device works using the present simple in the third person (e.g., "The compiler translates source code. It generates an executable file.").
Readings : [SJ02], [Cam06], [Mac99]	

Unit 4: What Engineers Do (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Simple II (I/You/We/They) for describing professional routines. • Questions and negatives with 'Do/Does' in technical contexts. • Engineering roles: developer, analyst, researcher, systems engineer. • Adverbs of frequency in describing work cycles and testing schedules.	• Students describe the daily tasks and professional roles of computing engineers and scientists using the present simple with accuracy.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 5: Inside a Computer (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Existential: There is / There are applied to architecture descriptions. • Prepositions of place: components on a motherboard, files in a directory. • Vocabulary: memory, storage, buses, slots, ports, layers. • Describing network topology and physical infrastructure.	• Students describe the spatial organization of hardware components and file systems, enabling them to interpret and produce technical architecture descriptions.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 6: Can Computers Think? (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Modal verb Can/Can't to describe computing capabilities and limitations. • Adverbs of manner applied to system performance. • Past of verb 'To Be' (Was/Were): early computing systems and pioneers. • Basic expressions for technical support and troubleshooting.	• Students describe what computing systems can and cannot do, and identify basic facts about the early history of computing using simple past structures.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 7: Computing History (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Past Simple: Regular and Irregular verbs to narrate tech history. • Time expressions for the past: invented, developed, published, launched. • Key figures: Turing, Babbage, Lovelace, von Neumann. • Vocabulary: Generations of computers, milestones, inventions.	• Students narrate key events in the history of computing and science using the simple past correctly, identifying the contributions of foundational figures.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 8: My Professional Goals in Computing (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Introduction to Technical English for Computing and Engineering. • Reading and understanding simple technical specifications. • Working in multicultural engineering teams: communication norms. • Oral presentation: "My role in the computing field".	• Students present their professional goals in computing using basic technical vocabulary and connect them to the roles and responsibilities of software and hardware engineers.
Readings : [SJ02], [Cam06], [Mac99]	

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

[Mac99] James MacGrew. *Focus on Grammar Basic*. Editorial Oxford, 1999.

[SJ02] Liz Soars and John. *American Headway N 2 Student Book*. Editorial Oxford, 2002.

[Cam06] Cambridge. *Diccionario Inglés-Espanol Cambridge*. Editorial Oxford, 2006.

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

1. COURSE

EG263. Communication II (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG263. Communication II
2.2 Semester	:	2nd Semester.
2.3 Credits	:	3
2.4 Hours	:	4 HT;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	EG163. Communication I. (1st Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Comunicación II es el segundo curso de la línea de comunicación del Área de Estudios Generales, de naturaleza teórico-práctica y carácter obligatorio. Tiene como propósito el fortalecimiento de la competencia comunicativa de los estudiantes mediante la comprensión, producción y comunicación oral y escrita de discursos académicos de acuerdo con su especialidad. Comprende el texto lingüístico (estructura y redacción), los documentos académicos y el artículo académico, los principios básicos de la redacción (coherencia y cohesión), el proceso de producción escrita (planificación, textualización y revisión), el ensayo académico y las normas APA para citas y referencias.

5. GOALS

- Aplicar estrategias lectoras en resúmenes y textos con contenido temático relacionado con la carrera profesional.
- Utilizar las técnicas de redacción de un texto académico, articulando documentos escritos en diversos contextos académicos y científicos.
- Producir un ensayo académico aplicando los procesos de planificación, textualización y revisión, con normas APA.

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-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Usage)

7. TOPICS

Unit 1: (20 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• El texto lingüístico. Niveles del texto: macroestructura, microestructura y superestructura. Características de la redacción. • Los documentos académicos. El artículo académico: modalidades, estructura, elementos. • Principios básicos de la redacción: coherencia y cohesión. Comprensión de textos académicos: ideas principales y secundarias. • El léxico académico y sus características. Estrategias para la elaboración de resúmenes académicos. • La redacción científica. El proceso de producción escrita: planificación, textualización, revisión.	• Identifica y analiza la macroestructura, microestructura y superestructura de textos lingüísticos relacionados con su carrera profesional. [Usar]. • Reconoce los documentos académicos e identifica las modalidades, estructura y elementos del artículo académico. [Usar]. • Identifica las ideas principales y secundarias, y aplica elementos de coherencia y cohesión en la producción de un artículo académico breve. [Usar]. • Selecciona y organiza las ideas principales y secundarias de un texto académico, elaborando un resumen relacionado con su carrera profesional. [Usar].
Readings : [**Aguirre2014**], [**Bernal2007**]	

Unit 2: (28 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• El ensayo: características, clases y estructura. El proceso de producción del ensayo: planificación, textualización, revisión. • Proceso de redacción: planificación individual del ensayo. Análisis de la necesidad comunicativa, investigación, comprensión y selección de información. Organización de la información, tesis y argumentos. • Recursos para la redacción académica: citas, datos, ejemplos, definiciones, paráfrasis. Ética en la producción de textos: reconocimiento de la autoría, uso responsable de fuentes y prevención del plagio. Normas APA. • Proceso de redacción: textualización. El párrafo: características y clasificación. Principios básicos de la redacción: cohesión y coherencia. • Evaluación y cierre: revisión del ensayo académico considerando coherencia, cohesión, uso ético de fuentes y normas APA.	• Caracteriza y reconoce las clases y estructura del ensayo, identificando los procesos de su producción escrita. [Usar]. • Planifica el ensayo académico, formulando su esquema de redacción y aplicando estrategias para garantizar la adecuación y coherencia. [Usar]. • Selecciona y utiliza fuentes académicas, incorporando citas y paráfrasis de manera ética y respetando la autoría mediante la aplicación de las normas APA. [Usar]. • Identifica y aplica los distintos tipos de párrafo, y los elementos de cohesión y coherencia, en el ensayo que está produciendo. [Usar]. • Revisa y mejora el ensayo académico considerando criterios de coherencia, cohesión, uso ético de fuentes y normas APA. [Evaluar].
Readings : [**AmericanPsychologicalAssociation2019**], [**JucaMaldonado2022**]	

Unit 3: (24 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Proceso de redacción: textualización. El párrafo de desarrollo: características y clasificación. • Pertinencia y solidez: la argumentación. Producción del artículo académico. • Las estrategias argumentativas. Contraargumentación y concesión. • El párrafo de cierre: características y clasificación. • Proceso de redacción: revisión y presentación del ensayo académico.	• Aplica estrategias y recursos de textualización en la redacción del cuerpo del ensayo académico. [Usar]. • Analiza y aplica criterios de pertinencia y solidez en la textualización de documentos académicos, planificando y redactando un artículo académico relacionado con la arquitectura y el urbanismo. [Usar]. • Identifica las estrategias argumentativas y desarrolla la argumentación y contraargumentación que necesita el ensayo. [Usar]. • Identifica y aplica las características y los tipos de párrafo en la redacción del cierre del ensayo. [Usar]. • Aplica estrategias de revisión y presenta el ensayo académico realizando las correcciones y modificaciones pertinentes. [Evaluar].
Readings : [**Aguirre2014**], [**Nunez2016**]	

8. WORKPLAN

8.1 Methodology

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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

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

1. COURSE
EG264. Philosophy (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG264. Philosophy
2.2 Semester	:	2nd Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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
Filosofía pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito desarrollar la reflexión y el juicio crítico, así como el interés ante los diversos problemas del mundo, del hombre y de la vida que se han presentado al pensamiento humano, mediante el análisis de las posiciones y teorías de los filósofos a través del tiempo y la expresión de puntos de vista propios. Comprende el origen de la filosofía, sus disciplinas, la filosofía griega y sus filósofos, la filosofía cristiana y la escolástica, el problema del conocimiento en la edad moderna (racionalismo, empirismo, criticismo), la filosofía política moderna, y la filosofía contemporánea, latinoamericana y peruana.

5. GOALS

- Identificar las disciplinas filosóficas y los filósofos más representativos de la filosofía antigua y media, y su trascendencia hasta la actualidad.
- Reflexionar críticamente en torno al problema del conocimiento y la filosofía política en la época moderna.
- Reflexionar críticamente sobre la filosofía contemporánea, latinoamericana y peruana, y su relación con los problemas sociales y políticos.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Familiarity)

AG-A02) Applies ethical principles and the standards of professional architectural practice, respecting the legal framework and human diversity. (Familiarity)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• Origen de la filosofía: naturaleza y método, condiciones para su surgimiento, actitudes humanas. ¿Qué es la filosofía? • Disciplinas filosóficas: ontología, antropología, gnoseología, epistemología, axiología, ética, estética. • Filosofía griega: características, etapas, filósofos y legado. • Filósofos y su trascendencia: Sócrates, Platón, Aristóteles. • Filosofía media: características, la escolástica y sus filósofos.	• Analiza las condiciones del surgimiento, el concepto de filosofía y las actitudes humanas. [Familiarizarse]. • Identifica las disciplinas filosóficas (ontología, antropología, gnoseología, epistemología, axiología, ética, estética) y su importancia. [Familiarizarse]. • Describe aspectos importantes de la filosofía griega y analiza su trascendencia en la actualidad. [Familiarizarse]. • Identifica a los filósofos más representativos (Sócrates, Platón, Aristóteles) y su importancia hasta la actualidad. [Familiarizarse]. • Identifica y analiza aspectos importantes de la filosofía media (escolástica y sus filósofos). [Familiarizarse].
Readings : [**BetancourtDelgado2021**], [**Pastor2010**]	

Unit 2: (21 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Filosofía moderna: el problema del conocimiento, el racionalismo, el empirismo, el criticismo. • La filosofía política en la edad moderna: características y filósofos (Maquiavelo, Thomas Hobbes, John Locke). • El problema histórico social. La importancia de los ODS para las universidades. • El problema del conocimiento: posibilidad, origen y esencia. • El problema de la ciencia. El problema del hombre y de la vida.	• Identifica, analiza y reflexiona sobre aspectos importantes de la filosofía moderna llevados al problema contemporáneo (el problema del conocimiento: racionalismo, empirismo, criticismo). [Usar]. • Identifica y analiza aspectos importantes de la filosofía política en la edad moderna, según los filósofos de la época (Maquiavelo, Thomas Hobbes, John Locke). [Usar]. • Analiza el problema histórico social desde el punto de vista de la filosofía, y la importancia de los ODS para las universidades desde el punto de vista ético. [Usar]. • Analiza el problema del conocimiento (posibilidad, origen y esencia) a través de trabajos grupales. [Usar]. • Analiza el problema de la ciencia, y el problema del hombre y de la vida, a través de trabajos grupales e individuales. [Usar].
Readings : [**SanzSantacruz2005**], [**CabreraMendoza2012**]	

Unit 3: (18 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Filosofía contemporánea: contexto y corrientes filosóficas. • Filosofía en el Perú: aspectos resaltantes y trascendencia. • Filosofía en Latinoamérica: aspectos resaltantes y trascendencia. • Corrientes filosóficas latinoamericanas de las últimas décadas del siglo XX y su relación con los problemas sociales y políticos.	• Analiza e identifica los aspectos importantes de la filosofía contemporánea: contexto y corrientes filosóficas, a través de organizadores grupales y exposición. [Usar]. • Identifica los aspectos resaltantes de la filosofía en el Perú y su trascendencia, a través de monografías/ensayos grupales y exposiciones. [Usar]. • Identifica los aspectos resaltantes de la filosofía en Latinoamérica y su trascendencia. [Usar]. • Reflexiona críticamente sobre la filosofía latinoamericana de las últimas décadas del siglo XX y su relación con los problemas sociales y políticos. [Usar].
Readings : [**BarciaLago2023**], [**Castro2013**]	

8. WORKPLAN

8.1 Methodology

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8.2 Theory Sessions

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

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

1. COURSE

EG265. Peruvian Territory. National Defense and Security (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG265. Peruvian Territory. National Defense and Security
2.2 Semester	:	2nd Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Territorio Peruano. Defensa y Seguridad Nacional pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito la comprensión de la realidad geográfica del Perú, reconociendo sus particularidades, así como el sistema de seguridad y defensa nacional, de modo que el estudiante adquiera conocimientos sobre la realidad socioeconómica y sociocultural de su comunidad, región y del ámbito nacional. Comprende la geografía del Perú y sus pisos ecológicos, el Estado peruano y la constitución política, los principios y valores de la persona humana, la responsabilidad social, la corrupción y sus causas, y el sistema de defensa nacional y defensa civil.

5. GOALS

- Analizar las principales características del territorio peruano, sus recursos naturales y la importancia de la geografía y los ODS en el Perú.
- Analizar a la persona humana y su relación con la constitución política del Perú, la responsabilidad social y la problemática de la corrupción.
- Analizar la importancia de la seguridad y la defensa nacional del Perú.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

AG-A02) Applies ethical principles and the standards of professional architectural practice, respecting the legal framework and human diversity. (Familiarity)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• El Estado peruano: concepto, origen, funciones, fines. La nación. La constitución política. Poderes del Estado. • Escuelas geográficas: determinismo, posibilismo, geografía cuantitativa, geografías radicales, geografía sistémica. Divisiones de la geografía física y humana. • La geografía del Perú: los pisos ecológicos, la biodiversidad, la cordillera de los Andes y la situación geopolítica del Perú en América Latina. • Los Objetivos de Desarrollo Sostenible: importancia, características, objetivos y contexto actual.	• Describe aspectos importantes del Estado peruano y analiza la importancia de la constitución política del Perú. [Familiarizarse]. • Identifica las escuelas geográficas para su mejor comprensión y analiza las divisiones de la geografía contextualizándolas en su territorio. [Familiarizarse]. • Comprende la influencia de la cordillera de los Andes y analiza la situación geopolítica del Perú en América Latina. [Familiarizarse]. • Identifica la importancia de los Objetivos de Desarrollo Sostenible. [Familiarizarse].
Readings : [**LandaArroyo2013**], [**AsociacionFondo2017**]	

Unit 2: (21 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• Principios y valores de la persona humana: concepto, valores fundamentales (libertad, justicia, verdad, solidaridad, respeto, responsabilidad), principios éticos universales. • Defensa de la persona humana: el papel del Estado, organismos internacionales y defensa de los derechos humanos, casos de violación de la dignidad humana. • Fundamentos de la responsabilidad social: definición y evolución, responsabilidad social empresarial vs. responsabilidad social universitaria. • Concepto y tipología de la corrupción: soborno, malversación de fondos, colusión, tráfico de influencias, nepotismo, fraude electoral, enriquecimiento ilícito. • Causas de la corrupción en el Perú: consecuencias en la economía, política y sociedad. Índice de Percepción de la Corrupción.	• Identifica y analiza los principios y valores de la persona a través de trabajos grupales y exposiciones. [Usar]. • Identifica y analiza aspectos importantes de la defensa de la persona en la sociedad actual, incluyendo organismos internacionales y casos de violación de la dignidad humana. [Usar]. • Analiza la importancia de la responsabilidad social y universitaria en su localidad. [Usar]. • Analiza el problema de la corrupción en nuestra sociedad: definición y tipología. [Usar]. • Analiza e identifica las causas de la corrupción en el Perú, sus consecuencias en la economía, la política y la sociedad. [Usar].
Readings : [**Santiago2023**], [**Quiroz2019**]	

Unit 3: (18 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• La defensa nacional: objetivos, identidad nacional, defensa interna y externa. • Sistema de Defensa Nacional: ámbitos, fundamentos, niveles, funciones, estructura y planeamiento estratégico. Movilización nacional y defensa civil. • La seguridad integral y la defensa nacional. Relación entre el pueblo, el territorio y el poder. Expresiones del poder nacional. • Sistema de Defensa Civil: características, fase e importancia de la movilización nacional.	• Analiza e identifica los aspectos importantes de la defensa nacional, a través de organizadores grupales y exposición. [Usar]. • Identifica los aspectos resaltantes del Sistema de Defensa Nacional del Perú: ámbitos, fundamentos, niveles, funciones, estructura y planeamiento estratégico. [Usar]. • Identifica los aspectos resaltantes de la seguridad integral y la defensa nacional, y su trascendencia. [Usar]. • Reflexiona sobre el sistema de defensa civil y su relación con los problemas sociales y políticos. [Usar].
Readings : [**GobPe**], [**MilPe**]	

8. WORKPLAN

8.1 Methodology

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8.2 Theory Sessions

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

UNIVERSIDAD PRIVADA DE TACNA

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

1. COURSE

AR1D3. Design Studio III (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1D3. Design Studio III
2.2 Semester	:	3rd Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR1D2. Design Studio II. (2nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio III: Collective Housing moves the student from the single dwelling designed in Design Studio II (AR1D2, prerequisite) to medium-density collective housing. Students explore housing typologies – blocks, duplexes, row houses – and the relationship between the individual unit, the building, and shared community space. The studio places particular emphasis on the lateral structural systems that medium-density housing requires, and on designing equitably for the social diversity of a collective housing community. This course is the foundation for Design Studio IV (AR2D1), which introduces the program's first public building typology.

5. GOALS

- Design housing units within medium-density typologies (blocks, duplexes, row houses) and organize them into a coherent building and urban fabric.
- Analyze and apply urban morphology concepts – street, block, and plot systems – to the siting of a collective housing project.
- Design the lateral load-resisting system (moment frames, braced frames, shear walls) and coordinate it with the floor diaphragm, appropriate to a medium-density housing building.
- Apply equity, accessibility, and gender-sensitive design principles to the design of shared community space within the housing project.

6. COMPETENCES

AG-A02) Applies ethical principles and the standards of professional architectural practice, respecting the legal framework and human diversity. (Usage)

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A15) Understands the relationship between people, buildings, and their environment, and the need to relate buildings and spaces to human scale and needs. (Usage)

7. TOPICS

Unit 1: Housing and Residential Environments (12 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Housing typologies: single-family detached, row house, courtyard building, walk-up apartment, point tower, slab block, double-loaded corridor, • Affordable housing strategies: inclusionary zoning, density bonuses, cross-subsidization, public-private partnerships, community land trusts (CLTs), and the financial • Housing quality and dweller control: orientation for sunlight and ventilation, unit deepth to window ratio, privacy thresholds (distance to opposite windows), acoustic separation • Mixed-income and social mix housing: fostering social interaction, avoiding stigma of large public housing projects (Pruitt-Igoe lessons), • Housing policy frameworks: Vienna's social housing model, Singapore's public housing, Chilean housing subsidies,	• Identify the principal housing typologies and their urban density contributions, and describe the design qualities that distinguish high-quality residential environments from poorly designed ones [Familiarity] • Design a housing block at the neighborhood scale, specifying building typology mix, dwelling unit orientation and ventilation strategy, [Usage] • Evaluate a housing project for quality of life, affordability, and urban integration, using indicators such as floor-to-ceiling height, access to light [Assessment]
Readings : [**Schneider2007**]	

Unit 2: Urban Form and Morphology (10 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Kevin Lynch's city image elements: paths, edges, districts, nodes, and landmarks; their role in legibility and wayfinding; application to urban design analysis and intervention • Street, block, and plot systems: typologies (grid, radial, organic, cul-de-sac), block dimensions and permeability, plot subdivision, • Urban building typologies: single-family detached, row house (townhouse), courtyard building, slab, point tower, and linear block • Morphological analysis methods: Conzenian (burgage cycle, fringe belts), space syntax (integration, connectivity, choice), and figure-ground diagrams for reading urban form • Urban fabric layers: plot subdivision history, street network evolution, land use succession, and the persistence of plot boundaries over centuries as a design constraint	• Identify the key morphological elements of a city - streets, blocks, plots, buildings - and describe the relationships among them that define urban character [Familiarity] • Apply morphological analysis tools (figure-ground, space syntax) to an urban sector, identifying its legibility, connectivity, and typological diversity [Usage] • Evaluate the morphological coherence and permeability of a proposed urban design, comparing block sizes, street connectivity, [Assessment]
Readings : [**KropfMorphology2017**]	

Unit 3: Human-Centered and Inclusive Design (8 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Universal design principles: equitable use, flexibility in use, simple and intuitive operation, perceptible information, tolerance for error, low physical effort, and size • Accessibility standards and codes: ADA, ISO 21542, and regional building codes for accessible routes, ramps, elevators, restrooms, signage, and emergency egress • Spatial user experience: wayfinding, legibility, sensory richness, acoustic comfort, and the design of spaces that support diverse activities, ages, and abilities • Participatory design processes: engaging future users and communities in defining spatial needs; co-design workshops, interviews, and community mapping as design tools	• Describe the principles of universal design and inclusive architecture and explain how they translate into spatial and technical design decisions [Familiarity] • Apply universal design principles and accessibility standards to develop an architectural design that accommodates the full spectrum of human ability, age, and cultural background [Usage] • Evaluate a building or public space design for inclusivity and accessibility, identifying barriers and proposing design modifications to improve equity and user experience [Assessment]
Readings : [**Neufert2012**]	

Unit 4: Lateral Load-Resisting Systems (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Horizontal load-resisting systems: moment-resisting frames (rigid connections), braced frames (concentric, eccentric), shear walls (concrete, plywood, CLT), • Floor and roof diaphragms: rigid vs. flexible diaphragm behavior, chord forces, collector elements, and load transfer from diaphragms to vertical lateral-resisting elements	• Identify the primary lateral load-resisting systems - moment frames, braced frames, shear walls - and describe the role of floor and roof diaphragms in transferring lateral loads to them [Familiarity] • Select and configure an appropriate lateral load-resisting system - moment frame, braced frame, or shear wall - for a mid-rise collective-housing building, coordinating it with the floor diaphragm [Usage] • Evaluate a mid-rise building's lateral system for configuration irregularities (soft stories, torsional irregularities) and diaphragm continuity [Assessment]
Readings : [**Schierle2012**]	

Unit 5: Social Equity and Inclusive Urbanism (8 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• Spatial justice frameworks: Fainstein's just city (democracy, equity, diversity), Soja's seeking spatial justice, • Gentrification and displacement: stages of gentrification, direct and indirect displacement (exclusionary displacement), anti-displacement strategies (rent control • Participatory planning and community engagement: Arnstein's ladder of participation (manipulation to citizen control), deliberative methods (planning cell, consensus conference • Equitable transportation: transit deserts, fare equity, accessibility for persons with disabilities, safe routes for walking and cycling, • Gender-inclusive urbanism: safety audits, lighting and sightlines for perceived safety, access to childcare facilities,	• Identify the main dimensions of spatial justice - distribution, procedure, recognition - and describe how urban planning decisions can produce or mitigate inequitable outcomes [Familiarity] • Apply an equity assessment tool (e.g., equity scorecard, health impact assessment) to an urban development proposal, identifying which populations benefit [Usage] • Evaluate a participatory planning process for authenticity, power-sharing, and representation, recommending changes to increase meaningful participation of marginalized [Assessment]
Readings : [**FainsteinJustCity2010**]	

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

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

1. COURSE

AR2B1. Multidisciplinary Coordination (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2B1. Multidisciplinary Coordination
2.2 Semester	:	3rd Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR1B2. Parametric Modeling and Generative Design. (2nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Multidisciplinary Coordination is the third course of the ten-course BIM I-X sequence, building directly on the parametric modeling and generative design skills developed in Parametric Modeling and Generative Design (AR1B2). It shifts the sequence's focus from single-author model authoring to the federated, multidisciplinary practice that defines real BIM projects: assembling and coordinating models from multiple disciplines, resolving clashes through a Common Data Environment, collaborating in real time on cloud-based platforms, and tracking design and construction issues through model-linked BCF and RFI workflows. This course precedes BIM Execution Planning (AR2B2), which formalizes these practices into standards and delivery-method requirements.

5. GOALS

- Coordinate federated, multidisciplinary BIM models to detect and resolve design conflicts before construction, applying a shared Common Data Environment protocol.
- Collaborate on a shared BIM model in real time across disciplines, using cloud-based BIM platforms and agreed model-sharing and worksharing conventions.
- Track and resolve design and construction issues through model-linked workflows, including BCF-based issue tracking, model-based RFIs, and submittal tracking.
- Build hands-on proficiency in the coordination and collaboration software tools covered in the course through guided, cumulative practicum exercises aligned with industry certification.

6. COMPETENCES

AG-A03) Performs effectively as an individual and as a member or leader in diverse, inclusive teams, in multidisciplinary in-person and remote environments. (Usage)

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

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

7. TOPICS

Unit 1: Multidisciplinary Model Coordination (24 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• BIM coordination and clash detection: federated model assembly, hard and soft clash detection in Navisworks or Solibri, clash resolution workflows, and the reduction of RFIs • IFC and open BIM standards: the IFC schema for vendor-neutral model exchange, BCF (BIM Collaboration Format) for issue tracking, and openBIM coordination workflows across authoring platforms • Common Data Environment (CDE): shared, work-in-progress, published, and archive states for model and document management; naming conventions and version control in a multi-party project	• Describe the role of model coordination in a multidisciplinary project, including federated models, clash detection, and the Common Data Environment [Familiarity] • Apply BIM coordination tools to detect and resolve clashes in a federated building model, documenting issues through a Common Data Environment workflow [Usage] • Evaluate a model-coordination protocol for a construction project, assessing federation strategy, clash-detection coverage, and CDE governance [Assessment]
Readings : [Sac+18]	

Unit 2: Collaborative BIM Workflows (24 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• BIM collaboration: federated models, clash detection and resolution, model-based quantity takeoff for estimating • Cloud-based BIM collaboration platforms: real-time multi-user editing (BIM 360/ACC, BIMcloud, Trimble Connect), permissions, and worksharing	• Describe how cloud-based BIM collaboration platforms support real-time, multi-user, multidisciplinary model development [Familiarity] • Develop a BIM collaboration protocol for a project, specifying model sharing standards, clash detection frequency, and meeting rhythms [Usage] • Evaluate a project's BIM collaboration setup for its effectiveness in supporting multidisciplinary, real-time teamwork [Assessment]
Readings : [HM15]	

Unit 3: Model-Based Issue and RFI Management (24 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• BCF (BIM Collaboration Format)-based issue tracking: creating, assigning, and closing model-linked issues across authoring platforms • Model-based requests for information (RFIs): linking an RFI to specific model elements and views, and tracking its resolution back into the model • Submittal tracking tied to model elements: linking product data and shop-drawing submittals to the BIM elements they specify	• Describe how BCF-based issue tracking, model-based RFIs, and submittal tracking keep design and construction issues linked to specific model elements [Familiarity] • Create, assign, and track a set of model-linked issues through BCF, and link a submittal or RFI to the model elements it affects [Usage] • Evaluate a project's model-based issue log for traceability, timely resolution, and completeness of the links between issues and model elements [Assessment]
Readings : [HM15]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [HM15]	

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

[HM15] Brad Hardin and Dave McCool. *BIM and Construction Management: Proven Tools, Methods, and Workflows.* 2nd. Wiley, 2015.

[Sac+18] Rafael Sacks et al. *BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers.* 3rd. Wiley, 2018.

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

1. COURSE

AR3R1. 3D Modeling and Virtual Animation (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3R1. 3D Modeling and Virtual Animation
2.2 Semester	:	3rd 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	:	AR2R1. Digital Drafting. (2nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

3D Modeling and Virtual Animation closes the Representation sequence, building on the CAD/BIM production pipeline from Digital Drafting (ARC2R1) and extending it into real-time 3D, simulation, and immersive media (SketchUp/V-Ray/Blender, Unreal Engine/Twinmotion). It is the course that equips students to actually communicate the territorial and urban proposals developed in the Taller de Urbanismo sequence to authorities, investors, and affected communities – the course's own emphasis on storytelling and citizen participation makes this an explicit communication, not just a visualization, skill.

5. GOALS

- Build geo-referenced, hyperrealistic 3D models of existing or proposed urban environments, integrating multi-sector data (buildings, vegetation, infrastructure).
- Run performance/impact simulations on 3D urban models (daylight, traffic, flood scenarios) to support planning decisions.
- Produce immersive, interactive experiences (VR/AR walkthroughs) with basic navigation and information layers for community engagement.
- Communicate urban proposals persuasively to non-technical audiences through narrative, real-time animation, and storytelling techniques.

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-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Assessment)

7. TOPICS

Unit 1: Three-Dimensional Modeling (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Geometric modeling types: solid modeling (extrude, loft, revolve, boolean operations), surface modeling (NURBS, patches), mesh modeling (subdivision) • Modeling workflows: massing model (initial concept), schematic model (rooms, openings), detailed model (materials, joinery, fixtures), • 3D rendering for presentation: material assignment (diffuse, roughness, metallic, transparency), lighting setup (directional, point, ambient, HDRI), camera settings (focal length • UV mapping and texturing: UV coordinates for applying 2D images to 3D surfaces, texture mapping (diffuse, bump, normal, displacement), and avoiding texture stretching and seams • Interoperability between modeling tools: file formats (OBJ, FBX, STEP, STL, 3MF) and common translation issues (lost geometry, material mapping	• Describe the differences between solid, surface, and mesh modeling and identify the appropriate modeling technique for a given architectural task (massing, detailed component [Familiarity] • Create a detailed 3D model of a building component (window, stair, facade panel) using solid modeling operations, then generate a rendered view with materials and lighting [Usage] • Evaluate the quality of a 3D model for a specific use (rendering, 3D printing, BIM integration), assessing geometric accuracy, topology cleanliness, and resolution appropriateness [Assessment]
Readings : [Bri20]	

Unit 2: Simulation and Performance Analysis (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Daylight simulation workflows: importing geometry into Radiance-based tools (DIVA, ClimateStudio), setting materials (reflectance, transmittance), defining sky models (overcast • Energy modeling workflows: setting up geometry in OpenStudio/EnergyPlus or IES VE, defining construction assemblies (U-value, SHGC), schedules, internal loads, HVAC systems, • Solar radiation analysis: calculating incident solar radiation on building surfaces (facade, roof, ground) using Ladybug or ClimateStudio • Thermal comfort simulation: PMV (predicted mean vote) and adaptive comfort models in EnergyPlus; natural ventilation modeling • Computational fluid dynamics (CFD) for architecture: simplified (zonal) vs. detailed (RANS, LES) airflow simulation	• Describe the main simulation types - daylight, energy, solar radiation, thermal comfort, and airflow - [Familiarity] • Perform a daylight simulation for a building facade using a climate-based model, interpreting sDA and ASE results to adjust aperture size, WWR, or shading [Usage] • Evaluate a simulation report for a building design, identifying unrealistic inputs (e.g., overly optimistic plug loads, missing shading) [Assessment]
Readings : [AHH18]	

Unit 3: Augmented, Virtual, and Mixed Reality (XR) (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Virtual reality for architectural design: immersive walkthroughs, scale verification, lighting and material perception, and the use of VR for client presentations • Augmented reality for construction and on-site coordination: overlaying BIM models onto physical construction via tablets or AR glasses (HoloLens) • Mixed reality for collaborative design: multi-user shared virtual environments, real-time sketching and model manipulation across remote locations, • XR workflow integration: exporting models from Revit, Rhino, or SketchUp to VR platforms (Enscape, Twinmotion, Unreal Engine), optimization for real-time performance (LOD • Usability and ethical considerations in XR for architecture: cybersickness, accessibility for users with disabilities, data privacy in shared virtual spaces,	• Describe the differences between virtual reality (VR), augmented reality (AR), and mixed reality (MR), [Familiarity] • Set up a VR walkthrough of an architectural model using a real-time rendering engine, optimizing the model for performance and evaluating the design at 1:1 scale in immersive mode [Usage] • Evaluate the usability of an AR or VR application for a specific architectural task (client presentation, design review, construction QA), identifying technical limitations [Assessment]
Readings : [Mil23]	

Unit 4: Architectural Communication and Presentation (24 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Design boards and panels: composition principles (grid, hierarchy, contrast, white space), integrating drawings (plan, section, elevation, axonometric, perspective), renderings • Architectural portfolio design: project selection (range of scales, stages, typologies), portfolio structure, narrative, captioning, • Physical model presentation: material choices (cardboard, foam, acrylic, 3D-printed, laser-cut), scale selection, level of detail, lighting • Verbal presentation of design: structuring a 5-10 minute design pitch (problem, concept, proposal, testing, conclusion), visual aids, responding to critique, • Architectural diagramming: circulation, program, structure, environmental performance, form generation, process	• Describe the key elements of effective architectural communication: narrative structure, visual hierarchy, appropriate level of detail, [Familiarity] • Produce a design presentation board (single panel) for an architectural project that integrates orthographic drawings, rendered views, diagrams, [Usage] • Evaluate a design portfolio or presentation for its communicative effectiveness, identifying strengths in narrative and visual clarity [Assessment]
Readings : [Dua08]	

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

[Dua08] Nancy Duarte. *Slide:ology – The Art and Science of Creating Great Presentations*. 1st. O'Reilly Media, 2008.

[AHH18] Tomas Akenine-Möller, Eric Haines, and Naty Hoffman. *Real-Time Rendering*. 4th. CRC Press, 2018.

[Bri20] Michael Brightman. *The SketchUp Workflow for Architecture*. 2nd. Wiley, 2020.

[Mil23] Jovan Milovanovic. *Unreal Engine for Architectural Visualization*. 1st. Packt Publishing, 2023.

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

1. COURSE

ID102. Technical and professional English II (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	ID102. Technical and professional English II
2.2 Semester	:	3rd Semester.
2.3 Credits	:	2
2.4 Hours	:	1 HT; 2 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	:	ID101. Technical and professional English I. (2nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Building on foundational English skills, this course develops the student's ability to communicate in technical and scientific contexts with greater fluency. Grammar structures are practiced through reading and producing descriptions of technological systems, scientific phenomena, and engineering processes. Students gain vocabulary relevant to computing, data, and the physical sciences.

5. GOALS

- Develop fluency in English applied to technical and scientific communication.
- Expand vocabulary in computing, data, and engineering domains.

6. COMPETENCES

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

7. TOPICS

Unit 1: Breakthroughs and Discoveries (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Simple Past Review: Affirmative and Negative in scientific contexts. • Time expressions with 'ago': When technologies were invented or released. • Conjunctions: and, so, but, because — structuring technical explanations. • Vocabulary: Scientific milestones, inventions, and discoveries.	• By the end of the unit, students narrate past technological breakthroughs and connect cause-and-effect relationships using simple past and conjunctions (e.g., "Scientists discovered X, so engineers developed Y").
Readings : [SJ02], [Cam06], [Mac99]	

Unit 2: Data and Variables (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Countable and Uncountable nouns in computing: files, data, code, memory. • Use of some, any, a lot of in quantifying technical resources. • Expressions of quantity: a little memory, a few errors, too many processes. • Vocabulary: Data types, variables, constants, and storage units.	• Students correctly use countable and uncountable noun structures to describe data, resources, and system states in technical contexts.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 3: Future of Technology (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Future plans: Verb + to + infinitive in project planning. • Use of 'Will' vs 'Going to' for predictions and scheduled releases. • Auxiliary verbs in forecasting: AI trends, cloud computing, quantum computing. • Vocabulary: Emerging technologies and career pathways in computing.	• Students express technological intentions and project plans, as well as make evidence-based predictions about computing and engineering trends.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 4: Comparing Technologies (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Comparative and superlative adjectives applied to hardware and software. • Comparing programming languages, operating systems, and algorithms. • Synonyms and antonyms in technical vocabulary. • Reading: Short technology comparison articles and benchmark reports.	• Students make detailed technical comparisons between systems, languages, and tools, using comparative and superlative structures accurately.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 5: Running Processes (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Continuous to describe active and ongoing technical processes. • Current use: "The server is processing requests." • Future use with Present Continuous: scheduled deployments and experiments. • Writing: Status updates and progress reports in technical projects.	• Students describe active computing processes, ongoing experiments, and scheduled technical activities using the present continuous form.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 6: Software Milestones (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Introduction to Present Perfect to describe achievements with current relevance. • Keywords: ever, never, yet, just — applied to software releases and research. • Vocabulary: Version history, patches, upgrades, published papers. • Reading: Technology news and software changelogs.	• Students communicate technical achievements and software milestones with present relevance, without specifying an exact time, using the present perfect.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 7: Technical Challenges (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Adjectives ending in -ed and -ing to describe technical experiences and processes. • Modal verbs of obligation: must, have to — applied to engineering requirements. • Vocabulary: Engineering challenges, constraints, trade-offs, and standards. • Writing: Short technical problem statements.	• Students describe the emotional and technical aspects of engineering challenges and express obligations and constraints using specialized vocabulary.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 8: English for Technology II (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Technical terminology: Input/output devices, storage, and peripherals. • Reading and following software installation and configuration instructions. • Communication in technical support: Describing symptoms and solutions. • Presentation: Describing a computing system to a non-specialist audience.	• By the end of the course, students interpret technical instructions, describe hardware components, and communicate basic computing concepts to diverse audiences in English.
Readings : [SJ02], [Cam06], [Mac99]	

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

[Mac99] James MacGrew. *Focus on Grammar Basic*. Editorial Oxford, 1999.

[SJ02] Liz Soars and John. *American Headway N 1 Student Book*. Editorial Oxford, 2002.

[Cam06] Cambridge. *Diccionario Inglés-Espanol Cambridge*. Editorial Oxford, 2006.

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

1. COURSE
EG364. Ethics (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG364. Ethics
2.2 Semester	:	3rd Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	EG264. Philosophy. (2nd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE
Ética pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito capacitar al estudiante en el conocimiento y aplicación de los principios éticos que deben regir su conducta y que le permitan asumir un compromiso ético en su trabajo y en la sociedad. Comprende la ética y la moral, el acto y la persona moral, la conciencia y responsabilidad moral, las teorías éticas y los dilemas morales, el Código de Ética del Colegio de Arquitectos del Perú, los casos de corrupción y falta de ética en la arquitectura, y la ética en proyectos arquitectónicos, licitaciones y ejecución de obras.

5. GOALS

- Reflexionar sobre la importancia de la integridad, la responsabilidad y el compromiso ético en el ejercicio profesional del arquitecto.
- Reflexionar sobre la importancia de la responsabilidad, el cumplimiento normativo y la transparencia en el contexto del Código de Ética del Colegio de Arquitectos del Perú.
- Reflexionar sobre la responsabilidad, el cumplimiento normativo y el rigor profesional frente a dilemas éticos en la práctica arquitectónica.

6. COMPETENCES

AG-A02) Applies ethical principles and the standards of professional architectural practice, respecting the legal framework and human diversity. (Assessment)

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• Presentación de la cátedra, la asignatura y su vínculo con los ODS y la Responsabilidad Social Universitaria. Análisis de conceptos fundamentales. • Contribuciones de la historia a la ética profesional contemporánea. Técnicas de análisis de dilemas éticos. • Ámbitos del ejercicio profesional y conceptos fundamentales de ética. Relación entre ética y responsabilidad social (ODS 8: trabajo decente). • Casos de corrupción y falta de ética en la arquitectura. Identificación de conductas antiéticas y repercusiones en proyectos arquitectónicos. Protocolos de actuación ante situaciones antiéticas.	• Analiza el contenido y la metodología del curso, y su vínculo con los ODS y la Responsabilidad Social Universitaria. [Familiarizarse]. • Analiza las contribuciones de la historia a la ética profesional contemporánea y las técnicas de análisis de dilemas éticos, resolviendo un ejercicio práctico sobre el impacto del desarrollo urbano. [Usar]. • Contrasta los ámbitos del ejercicio profesional y los eventuales dilemas éticos que podrían generarse, relacionando la ética con la responsabilidad social y el ODS 8 (trabajo decente). [Usar]. • Analiza casos de corrupción y falta de ética en la arquitectura, identificando conductas antiéticas y sus repercusiones en proyectos arquitectónicos. [Usar].
Readings : [**Lopez2019**], [**SantosPerez2017**]	

Unit 2: (21 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• Revisión del Código de Ética del CAP: estructura, fundamentos y antecedentes. Principios y lineamientos específicos. • Responsabilidad del arquitecto según el CAP: responsabilidad civil, penal y ética. Dilema sobre el trámite, ejecución e inspección municipal. • Dilemas éticos y el entorno sociocultural en la práctica arquitectónica en el contexto peruano. Normas de transparencia y anticorrupción. • Casos de corrupción y falta de ética en la arquitectura: identificación de conductas antiéticas y repercusiones en la ejecución de obras. Protocolos de actuación.	• Analiza métodos para identificar lineamientos éticos en documentos normativos, revisando la estructura, fundamentos y antecedentes del Código de Ética del Colegio de Arquitectos del Perú (CAP). [Usar]. • Analiza la responsabilidad civil, penal y ética del arquitecto según el CAP, resolviendo un dilema sobre el trámite, ejecución e inspección municipal. [Usar]. • Organiza el proceso educativo integrando contenidos que fomenten la reflexión ética y el pensamiento crítico frente a dilemas éticos y el entorno sociocultural en la práctica arquitectónica peruana. [Usar]. • Organiza mediación en conflictos éticos a partir de casos de corrupción y falta de ética en la arquitectura, identificando conductas antiéticas y repercusiones en la ejecución de obras. [Usar].
Readings : [**ColegioDeArquitectosDelPeru**], [**Martinez2016**]	

Unit 3: (18 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Ética social y ambiental de la arquitectura. Riesgos y seguridad sociales y ambientales en la responsabilidad profesional e institucional. • Ética en proyectos arquitectónicos y sus autorizaciones municipales. Riesgos y dilemas éticos. Evaluación crítica de un proyecto de habilitación urbana. • Ética en licitaciones y ejecuciones de obras. Riesgos y dilemas éticos. Evaluación crítica de un proceso de licitación y ejecución de obras.	• Analiza la ética social y ambiental de la arquitectura, y organiza mediación en conflictos éticos relacionados con riesgos y seguridad ambiental en la responsabilidad profesional e institucional. [Usar]. • Analiza los riesgos y dilemas éticos en proyectos arquitectónicos y sus autorizaciones municipales, desarrollando una evaluación crítica de un proyecto de habilitación urbana. [Evaluar]. • Analiza los riesgos y dilemas éticos en licitaciones y ejecuciones de obras, desarrollando una evaluación crítica de un proceso de licitación y ejecución de obras. [Evaluar].
Readings : [**Perez2017**], [**Garcia2018**]	

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

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

1. COURSE

EG366. Personal Development and Leadership (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG366. Personal Development and Leadership
2.2 Semester	:	3rd Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Desarrollo Personal y Liderazgo pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito desarrollar habilidades personales y sociales de los estudiantes, potenciando el avance de actitudes de comunicación asertiva, liderazgo y sana convivencia e inclusión con personas con discapacidad, favoreciendo su crecimiento personal y profesional. Comprende la inteligencia emocional, la inteligencia intrapersonal e interpersonal, el proyecto de vida, el liderazgo, la discapacidad, la persona con discapacidad, los tipos de discapacidad y los derechos de la persona con discapacidad.

5. GOALS

- Reconocer la inteligencia emocional y poner en práctica herramientas como el autoconocimiento y la automotivación.
- Reconocer la importancia del desarrollo personal y aplicarla en su entorno para una convivencia armoniosa.
- Identificar los tipos de discapacidad y analizar críticamente el desenvolvimiento en la sociedad, utilizando diversas estrategias de inclusión.

6. COMPETENCES

AG-A03) Performs effectively as an individual and as a member or leader in diverse, inclusive teams, in multidisciplinary in-person and remote environments. (Usage)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• Introducción al curso. Dinámica de conocimiento e integración. • Inteligencia emocional: reconociendo mis emociones. • Conocimiento e integración. • Auto conciencia: autoconocimiento. • Automotivación.	• Expresa sus expectativas, comparte sus inquietudes y reconoce su rol como estudiante. [Familiarizarse]. • Expresa y dramatiza el reconocimiento de sus propias emociones. [Familiarizarse]. • Realiza actividades grupales de participación usando habilidades verbales, no verbales y flexibilidad cognitiva. [Usar]. • Mediante un instrumento estandarizado y técnicas no verbales, reconoce las características personales que potencian y pueden dificultar su adaptación a la educación superior. [Usar]. • Utiliza estrategias de automotivación y motivación a otros, poniéndolas en práctica. [Usar].
Readings : [**Goleman1997**], [**Encinas1997**]	

Unit 2: (21 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• Autorregulación. Flexibilidad cognitiva: mi FODA personal. Diseño de un plan personal. • Regulación de emociones. • Autoestima y asertividad. • Escucha activa. • Conceptualización de la discapacidad y persona con discapacidad, y tipos de discapacidad.	• Expresa a través de un instrumento las actitudes positivas y las debilidades a mejorar, utilizando técnicas de aprender a pensar (FODA personal y diseño de un plan personal). [Usar]. • Analiza casos y realiza autoanálisis de sus emociones en la regulación de las mismas. [Usar]. • Utiliza frases asertivas para expresar puntos de conflicto considerando la inclusividad, en el desarrollo de la autoestima y la asertividad. [Usar]. • Mejora las habilidades de escucha activa de manera inclusiva. [Usar]. • Socializa la Ley General de las Personas con Discapacidad, entendiendo y asumiendo un rol de respeto y tolerancia hacia las personas con discapacidad. [Usar].
Readings : [**Basili1996**], [**Riso1997**]	

Unit 3: (18 hours)	
Competences Expected: AG-A03	
Topics	**Learning Outcomes**
• Derechos de una persona con discapacidad. Empatía: educación inclusiva para niños y niñas con necesidades educativas especiales asociadas a discapacidad. • Tolerancia y apertura a la discapacidad. Estereotipos que debemos superar sobre personas con discapacidad. • Trabajo en equipo y liderazgo: preparación de un proyecto de Proyección Social y de Servicio Universitario (PSSU) en una institución vulnerable. • Discapacidad e inclusión social. Ejecución del Plan de Actividad de PSSU en una institución de personas con habilidades diferentes.	• Identifica las principales características de las personas con necesidades especiales asociadas a la discapacidad, en el marco de los derechos de una persona con discapacidad. [Usar]. • Realiza un producto sobre la inclusión de personas con discapacidad, abordando tolerancia, apertura y estereotipos a superar. [Usar]. • Prepara y aplica un proyecto de Proyección Social y de Servicio Universitario (PSSU) en una institución vulnerable con personas con discapacidad, trabajando en equipo y liderazgo. [Usar]. • Ejecuta el plan de actividad de PSSU en una institución de personas con habilidades diferentes, y realiza un informe sobre las actividades realizadas. [Usar].
Readings : [**LeyGeneralDiscapacidad**], [**Encinas2001**]	

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

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

1. COURSE

AR1T1. Digital Topography (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR1T1. Digital Topography
2.2 Semester	:	4th Semester.
2.3 Credits	:	3
2.4 Hours	:	1 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

Digital Topography gives students the territorial-measurement and geospatial-data foundation – scale, coordinate systems, cartography, GIS, remote sensing – that every subsequent territorial-analysis and urban-planning studio course assumes. Unlike a classic surveying course centered on field instruments, this one is built on Territorial Analysis and Urban Information Systems (TAN), the Urbanism BOK's own knowledge area for exactly this content, so its digital/GIS emphasis matches how terrain and cadastral data are actually produced and consumed in contemporary urban planning practice.

5. GOALS

- Apply core territorial concepts (scale, spatial reference systems, coordinate systems) to locate and describe any urban or territorial element precisely.
- Produce coordinated cartographic representations of terrain, cadastral boundaries, and infrastructure at multiple scales.
- Build and query GIS datasets (vector/raster layers, attribute tables) to support urban and territorial analysis.
- Interpret remote-sensing and LIDAR-derived data (digital terrain models, slope/drainage analysis) for site diagnostics.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Assessment)

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

7. TOPICS

Unit 1: Territorial Concepts, Scales, and Spatial Reference (20 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Territory, place, region, landscape, and spatial extent as concepts for urban and territorial analysis • Parcel, block, neighborhood, municipality, metropolitan area, and region; scale effects and the modifiable areal unit problem • Census tracts, municipal limits, watersheds, labor-market areas, and metropolitan functional regions • Geographic coordinates, projected coordinate reference systems, datums, map projections, and units • Adjacency, containment, distance, direction, topology, and their role in geographic analysis • Scale, resolution, extent, positional accuracy, and temporal resolution and their effects on interpretation	• Describe territorial units, analytical scales, boundaries, and coordinate systems used in urban analysis [Familiarity] • Select defensible spatial units and coordinate systems for an urban or territorial research question [Usage] • Evaluate how scale, boundary choice, resolution, and spatial reference affect an urban analysis [Assessment]
Readings : [GW20]	

Unit 2: Cartography and Spatial Representation (20 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Map purpose, audience, extent, scale, projection, legend, title, sources, and orientation • Visual variables for spatial data: location, size, shape, hue, value, texture, and orientation • Quantitative map classification: equal interval, quantile, natural breaks, and implications for interpretation • Choropleth, proportional symbol, dot density, flow, isarithmic, and bivariate maps and their suitable data types • Communication of positional, attribute, temporal, and model uncertainty without misleading emphasis • Legibility, color-vision accessibility, visual hierarchy, annotation, and public-facing map design	• Identify cartographic choices that shape how urban data are represented and interpreted [Familiarity] • Produce a thematic map with an appropriate projection, classification, visual hierarchy, and source documentation [Usage] • Evaluate a map for accuracy, legibility, accessibility, and risk of misrepresenting spatial patterns [Assessment]
Readings : [GW20]	

Unit 3: Geographic Information Systems (20 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Vector points, lines, polygons, raster grids, attributes, geometry, and topology • Spatial databases, schemas, metadata, identifiers, coordinate systems, and geospatial layer management • Attribute and spatial queries: selection, overlay, proximity, spatial join, and Boolean combinations • Buffer, clip, dissolve, intersect, union, network analysis, raster reclassification, and zonal statistics • Integration of census, parcel, land-use, transport, environment, and field-survey layers with differing scales and schemas • Documented processing models, open formats, versioned inputs, quality checks, and reproducible outputs	• Explain GIS data models and spatial queries used in urban analysis [Familiarity] • Implement a documented GIS workflow that integrates urban datasets and produces a planning-relevant output [Usage] • Validate a GIS analysis for coordinate alignment, topology, attribute integrity, and reproducibility [Assessment]
Readings : [Lon+15]	

Unit 4: Remote Sensing and Earth Observation (20 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Satellite, aerial, and UAV platforms and their spatial, spectral, temporal, and radiometric resolution • Spectral signatures, bands, color composites, texture, and contextual interpretation of urban features • Supervised, unsupervised, and object-based land-cover classification; training data and accuracy assessment • Urban expansion, densification, land-cover change, and temporal comparison of imagery • Spectral indicators of vegetation, impervious surface, water, and surface temperature • Cloud, shadow, mixed pixels, sensor differences, classification error, and limits of inferring social conditions from imagery	• Describe remote-sensing data types and their uses and limitations for observing cities [Familiarity] • Classify an urban land-cover image and document training data, processing choices, and accuracy [Usage] • Evaluate a remote-sensing result for resolution, accuracy, comparability, and planning fitness [Assessment]
Readings : [CW21]	

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

[Lon+15] Paul A. Longley et al. *Geographic Information Science and Systems*. 4th. Wiley, 2015.

[GW20] Charles D. Ghilani and Paul R. Wolf. *Elementary Surveying: An Introduction to Geomatics*. 15th. Pearson, 2020.

[CW21] James B. Campbell and Randolph H. Wynne. *Introduction to Remote Sensing*. 6th. The Guilford Press, 2021.

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

1. COURSE

AR2B2. BIM Execution Planning (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2B2. BIM Execution Planning
2.2 Semester	:	4th Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2B1. Multidisciplinary Coordination. (3rd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

BIM Execution Planning is the fourth course of the ten-course BIM I-X sequence (AR1B1 to AR4B1), following Multidisciplinary Coordination (AR2B1, prerequisite). Having learned to author, document, organize, coordinate, and collaborate on a shared BIM model in the first three courses, students now step back to the project-management layer that governs how BIM itself is planned, mandated, and contracted: drafting a BIM Execution Plan (BEP) and information-delivery requirements under ISO 19650, identifying the national and jurisdictional BIM mandates and contractual provisions (model authorship, liability, intellectual property) that apply to a given project, and matching a project's delivery method – Design-Bid-Build, Design-Build, Construction Management at Risk, or Integrated Project Delivery – to the BIM maturity level it actually requires. The course's transversal Practicum unit continues the hands-on software-lab component that recurs, unchanged in structure, across all ten courses of the sequence.

5. GOALS

- Draft a BIM Execution Plan (BEP) for a project, specifying BIM goals, LOD matrix, and information-delivery milestones aligned with the ISO 19650 framework.
- Identify the BIM mandate or policy applicable to a given project's jurisdiction, and draft contractual provisions addressing model authorship, liability, and intellectual property for shared model data.
- Recommend a project delivery method (Design-Bid-Build, Design-Build, Construction Management at Risk, or IPD) and a target BIM maturity level appropriate to a given project's scale and ownership structure.
- Build hands-on proficiency in a BIM authoring/collaboration tool through a sequence of guided, graded practicum exercises culminating in a cumulative deliverable.

6. COMPETENCES

AG-A02) Applies ethical principles and the standards of professional architectural practice, respecting the legal framework and human diversity. (Usage)

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

7. TOPICS

Unit 1: BIM Execution Planning and Standards (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• BIM Execution Plan (BEP): project goals for BIM use (clash detection, 4D/5D, facility management), LOD matrix by discipline, model sharing protocols • ISO 19650 framework: information management using BIM across the delivery and operational phases of assets, information requirements (EIR, OIR, AIR), and the information-delivery cycle	• Describe the purpose of a BIM Execution Plan and the ISO 19650 information-management framework, and explain how they structure a project's BIM deliverables [Familiarity] • Draft a BIM Execution Plan for a project, specifying BIM goals, LOD matrix, and information-delivery milestones aligned with ISO 19650 [Usage] • Evaluate a BIM Execution Plan for a design project, assessing its LOD specifications, exchange protocols, and BIM use cases for adequacy and clarity [Assessment]
Readings : [Com11]	

Unit 2: BIM Standards, Policy, and Contracts (24 hours)	
Competences Expected: AG-A02	
Topics	**Learning Outcomes**
• National and regional BIM adoption mandates: policy frameworks requiring BIM on public infrastructure projects (e.g. Peru's Plan BIM Perú, UK BIM Mandate, EU BIM Task Group), and their implications for permit submission and interdisciplinary coordination • BIM in contracts and risk allocation: BIM Execution Plans as contract exhibits, model-authorship and liability clauses, and intellectual-property considerations for shared model data	• Describe the major national and international BIM policy frameworks, and explain how BIM Execution Plans and authorship clauses are used to allocate contractual risk [Familiarity] • Identify the BIM mandate or policy applicable to a given project's jurisdiction, and draft a contract clause addressing model authorship and liability [Usage] • Evaluate a project's compliance with applicable BIM mandates and the adequacy of its contractual provisions for model authorship and liability [Assessment]
Readings : [KN14]	

Unit 3: BIM Across Project Delivery Methods (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Project delivery methods and their effect on BIM responsibility: Design-Bid-Build, Design-Build, Construction Management at Risk, and Integrated Project Delivery (IPD) • BIM maturity levels (Level 0-3): from unmanaged CAD to fully collaborative, cloud-based, integrated BIM, and how procurement choice shapes the achievable level • Risk- and reward-sharing models in IPD and alliance contracts, and their relationship to shared BIM model responsibility	• Describe how different project delivery methods assign BIM responsibility differently, and explain the BIM maturity level framework [Familiarity] • Recommend a project delivery method and target BIM maturity level appropriate for a given project's scale and ownership structure [Usage] • Evaluate a project's chosen delivery method for whether it supports the BIM maturity level the project actually requires [Assessment]
Readings : [Fis+17]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [Sti23]	

8. WORKPLAN

8.1 Methodology

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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

[Com11] Computer Integrated Construction Research Program. *BIM Project Execution Planning Guide*. Version 2.1. Pennsylvania State University, 2011.

[KN14] Karen M. Kensek and Douglas E. Noble, eds. *Building Information Modeling: BIM in Current and Future Practice*. 1st. Wiley, 2014.

[Fis+17] Martin Fischer et al. *Integrating Project Delivery*. 1st. Wiley, 2017.

[Sti23] Daniel John Stine. *Autodesk Revit 2024 for Architecture*. 1st. SDC Publications, 2023.

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

1. COURSE

AR2D1. Design Studio IV (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2D1. Design Studio IV
2.2 Semester	:	4th Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR1D3. Design Studio III. (3rd Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio IV: Neighborhood Facilities is the student's first public-building project, following Design Studio III (AR1D3, prerequisite). Working at the scale of a neighborhood library or a community health post, students design a medium-scale public facility and, for the first time in the sequence, develop its structural system explicitly as part of the architectural proposal – selecting and sizing the vertical and lateral load-resisting elements, and coordinating them with construction assemblies, natural ventilation strategies, and the applicable building codes. This course is the foundation for Design Studio V (AR2D2).

5. GOALS

- Apply the fundamental principles of structural mechanics (loads, equilibrium, internal forces) to the design of a medium-scale public building.
- Select and size the vertical and lateral load-resisting systems (columns, walls, frames, diaphragms) of a neighborhood facility.
- Coordinate structural, envelope, and interior systems into a constructible building assembly.
- Verify a design proposal's compliance with applicable building codes, accessibility standards, and zoning regulations.
- Design naturally ventilated spaces using cross-ventilation and stack-effect strategies appropriate to the building's program and climate.

6. COMPETENCES

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

AG-A14) Possesses creative capacity in construction techniques, grounded in a comprehensive understanding of the disciplines and construction methods related to architecture. (Usage)

7. TOPICS

Unit 1: Structural Principles and Mechanics (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Types of loads: dead, live, snow, wind, seismic, and thermal; load combinations per ASCE 7; internal force diagrams (axial, shear, moment) in statically determinate beams • Stress-strain relationships for common structural materials: elastic and plastic behavior, yield strength, ultimate strength, modulus of elasticity, and ductility • Static equilibrium equations ($\sum F_x = 0$, $\sum F_y = 0$, $\sum M = 0$) and calculation of support reactions in beams, trusses, and simple frames • Truss analysis: method of joints, method of sections, zero-force members, and truss configurations (howe, pratt, warren, vierendeel) for different span conditions • Beam deflection: moment-area method, superposition, and the role of deflection limits (L/360, L/240) in serviceability design	• Describe the primary types of structural loads and internal forces, and explain how they influence the sizing and configuration of structural elements [Familiarity] • Calculate support reactions, shear and moment diagrams, and deflection in simple statically determinate beams and trusses [Usage] • Evaluate the structural adequacy of a simple beam or truss configuration against given load and deflection criteria, proposing cross-section or material changes where needed [Assessment]
Readings : [**Schierle2012**], [**Onouye2017**]	

Unit 2: Vertical Load Path and Foundations (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Vertical load-bearing systems: short vs. slender columns, buckling (Euler), effective length factor; load-bearing walls (masonry, concrete, timber, steel studs) • Foundation systems and load transfer: spread footings, continuous footings, pile caps, grade beams, and the role of connections in ensuring load path continuity • Structural grid design: bay sizes, column spacing implications for floor framing (one-way vs. two-way slabs, beam-and-girder, flat plate, flat slab),	• Identify the primary vertical load-bearing elements and foundation systems in a building, and describe how loads are transferred from the structural grid to the foundation [Familiarity] • Select and configure an appropriate column/wall system, foundation type, and structural grid for a medium-rise building, considering program and material availability [Usage] • Evaluate a building's vertical load path for continuity and foundation adequacy, identifying potential load-transfer discontinuities [Assessment]
Readings : [**Schierle2012**], [**Onouye2017**]	

Unit 3: Natural Ventilation and Indoor Air Quality (8 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Drivers for natural ventilation: wind pressure coefficients (C_p), stack effect (buoyancy), and combined wind and stack; ventilation rate calculation using the orifice equation • Cross-ventilation and stack ventilation design: opening placement (inlet vs. outlet heights), room depth limits for effective cross-flow (2-2.5× floor-to-ceiling height) • Indoor air quality standards and contaminants: ASHRAE 62.1 ventilation rate procedure, indoor pollutant sources (VOCs, CO_2, particulates), • Mixed-mode (hybrid) ventilation: sequencing strategies (changeover, zoned, concurrent), control logic for switching between natural and mechanical modes, • Airflow simulation for natural ventilation: computational fluid dynamics (CFD) for detailed analysis, zonal models for early design, and wind tunnel testing for complex geometries	• Describe the physical drivers of natural ventilation - wind and stack effect - and explain how opening size, placement, and building depth influence airflow rates [Familiarity] • Design a natural ventilation strategy for a building in a moderate climate, specifying opening sizes, heights, [Usage] • Evaluate a naturally ventilated building design using airflow simulation or simplified calculations, identifying zones with insufficient ventilation [Assessment]
Readings : [**BrownDeKay2001**]	

Unit 4: Building Systems and Assemblies (12 hours)	
Competences Expected: AG-A14	
Topics	**Learning Outcomes**
• Integration of building systems: coordinating structural frame, mechanical/electrical/plumbing (MEP), envelope, and interior fit-out within constrained floor-to-floor heights • Construction documentation for assemblies: details at 1:5, 1:10, and 1:20; section-through-wall details, sill and head conditions, and coordination between architectural • Construction tolerances and coordination: dimensional tolerances in concrete, steel, and masonry; clearances for MEP rough-in • Waterproofing and moisture management: below-grade waterproofing systems, drainage planes, vapor barriers, and flashing at penetrations • Fire-rated assemblies: UL-listed wall, floor, and ceiling assemblies; fire-stopping at penetrations, intumescent seals, and the architectural detailing required by fire codes • Prefabricated and modular assemblies: volumetric modular construction, panelized wall systems, and the design implications of off-site manufacturing tolerances	• Identify the principal building systems and describe how they are integrated and coordinated within a multi-story building assembly [Familiarity] • Develop construction-level details for a building assembly that correctly coordinate structural, envelope, and MEP systems within realistic tolerances and code requirements [Usage] • Evaluate a set of construction documents for assembly coordination quality, identifying conflicts, missing details, and buildability risks [Assessment]
Readings : [**AllenIano2019**]	

Unit 5: Building Codes, Accessibility, and Zoning (10 hours)	
Competences Expected: AG-A12	
Topics	**Learning Outcomes**
• Building codes and standards: IBC (International Building Code), IRC (International Residential Code), IFC (International Fire Code) • Means-of-egress and fire-evacuation route design: maximum travel distance to an exit, number and width of exits required by occupant load, exit discharge and assembly points, and diagramming evacuation routes on a life-safety plan • Accessibility codes: ADA Standards for Accessible Design, ICC A117.1, and local accessible building codes • Energy codes: IECC (International Energy Conservation Code), ASHRAE 90.1; prescriptive vs. performance paths • Zoning and land use regulations: zoning districts (residential, commercial, industrial, mixed-use), floor area ratio (FAR), lot coverage, setbacks, height limits • Permitting process: building permit, variance, special exception; code interpretation appeals; the architect's role in preparing permit sets, responding to plan review comments	• Describe the key provisions of building codes that affect architectural design - occupancy classification, means of egress, fire-resistance, accessibility, and energy performance [Familiarity] • Apply IBC occupancy and construction type tables to determine allowable building area and height for a given use and sprinkler status, [Usage] • Evaluate a building design's code compliance for accessibility (ADA) and life safety (IBC), identifying violations and recommending code-conforming modifications [Assessment]
Readings : [**ChingCodes2017**]	

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

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

1. COURSE

ID201. Technical and professional English III (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	ID201. Technical and professional English III
2.2 Semester	:	4^{th} Semester.
2.3 Credits	:	2
2.4 Hours	:	1 HT; 2 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	:	ID102. Technical and professional English II. (3^{rd} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

At this level, students engage with English as the primary medium for accessing and producing technical content in computing, engineering, and the sciences. Grammar structures are applied to reading scientific articles, writing technical reports, describing engineering processes, and participating in professional discussions. The course bridges everyday English fluency with the demands of technical communication.

5. GOALS

- Train students to read, understand, and produce technical communication in English.
- Provide linguistic tools for connecting ideas in descriptive and analytical writing about computing and engineering.

6. COMPETENCES

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

7. TOPICS

<table>
<tr><td colspan="2">Unit 1: Technical Communication (12 hours)</td></tr>
<tr><td colspan="2">Competences Expected: AG-A04</td></tr>
<tr><td>Topics</td><td>Learning Outcomes</td></tr>
<tr><td>• Review of Tenses: Present, Past, and Future in technical documentation.
• Interrogative sentences with complex Wh- questions for system analysis.
• Words with more than one meaning in technical contexts (Polysemy).
• Expressions for describing professional activities and research interests.</td><td>• By the end of the unit, students use various tenses to exchange detailed technical information and formulate precise questions about computing systems and engineering processes.</td></tr>
<tr><td colspan="2">Readings : [SJ02], [Cam06], [Mac99]</td></tr>
</table>

Unit 2: Comparing Architectures (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Use of "What's it like?": Describing system characteristics and interfaces. • Advanced comparative and superlative adjectives in benchmark analysis. • Collocations in computing: high-performance, low-level, fault-tolerant. • Reading: Architecture comparison reports (RISC vs. CISC, SQL vs. NoSQL).	• Students analyze and describe differences between computing architectures, frameworks, and systems using varied comparative structures with technical precision.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 3: Then and Now in Computing (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Perfect vs. Simple Past: Contrasting historic events with current state. • Time expressions: for, since, ever, never applied to technology evolution. • Adverbs of time and manner in scientific narrative. • Vocabulary: Generations of technology, legacy systems, current platforms.	• Students differentiate and correctly apply the present perfect and the simple past to narrate the evolution of computing technologies and contrast historical achievements with the current state of the field.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 4: Engineering Standards and Protocols (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Modals of obligation and permission: Have to, Must, Can in professional norms. • Giving technical recommendations: Should, Ought to — code reviews and design. • Vocabulary: IEEE/ACM standards, coding conventions, security policies. • Formal writing: Technical memos and engineering recommendations.	• Students express engineering rules, standards, and professional recommendations using appropriate modal verbs in formal technical writing and peer discussion.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 5: How Systems Are Built (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Passive Voice: Present and Simple Past to describe engineering processes. • Vocabulary: Manufacturing, deployment, integration, and testing. • Expressions for giving technical opinions and discussing design trade-offs. • Writing: Process description for a software or hardware system.	• Students use the passive voice to describe how systems are designed, built, tested, and deployed, participating in technical discussions about engineering processes.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 6: Debugging and Analysis (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Past Continuous vs. Simple Past in incident and failure reports. • Narrative and sequence connectors: while, when, suddenly, as a result. • Vocabulary: Bugs, exceptions, crashes, logs, root cause analysis. • Writing: Incident report for a software or network failure.	• Students narrate debugging sessions, system failures, and experimental incidents using narrative tenses and technical sequencing connectors fluently.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 7: Research and Innovation (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Future Forms: Will, Going to, Present Continuous for research projection. • Expressions of probability and certainty in scientific contexts. • Vocabulary: Innovation cycles, research proposals, technology forecasting. • Oral presentations: "The future of computing in my field".	• Students project research goals and discuss future directions in computing and engineering using various future structures with appropriate degrees of certainty.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 8: Technical English III (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Programming and Web Development terminology: functions, APIs, frameworks. • User Interface (UI/UX) descriptions and usability concepts. • Basic project management vocabulary: sprints, milestones, deliverables. • Writing: Simple technical specification or README document.	• By the end of the course, students use specialized software development vocabulary to describe logical and functional components and produce basic technical documentation in English.
Readings : [SJ02], [Cam06], [Mac99]	

8. WORKPLAN

8.1 Methodology

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8.2 Theory Sessions

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9. EVALUATION SYSTEM

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

10. BASIC BIBLIOGRAPHY

[Mac99] James MacGrew. *Focus on Grammar Basic*. Editorial Oxford, 1999.

[SJ02] Liz Soars and John. *American Headway N 2 Student Book*. Editorial Oxford, 2002.

[Cam06] Cambridge. *Diccionario Inglés-Espanol Cambridge*. Editorial Oxford, 2006.

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

1. COURSE

EG363. Ecology and Sustainable Development (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG363. Ecology and Sustainable Development
2.2 Semester	:	4^{th} Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Ecología y Desarrollo Sostenible pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito la comprensión de la interrelación entre los seres vivos y el medio ambiente, así como la repercusión de la problemática ambiental del mundo actual con el desarrollo de la vida y con el desarrollo económico y social, enfatizando en la comprensión de la responsabilidad del estudiante como persona y como profesional. Comprende los principios y conceptos de la ecología, los ecosistemas y la biodiversidad, la problemática ambiental y el cambio climático, la contaminación y los recursos naturales, y el desarrollo sostenible aplicado a la arquitectura.

5. GOALS

- Analizar los principios y conceptos fundamentales de la ecología, relacionando los componentes, procesos e interacciones de los ecosistemas con el equilibrio de los sistemas naturales.
- Analizar los principales problemas ambientales y sus efectos sobre los ecosistemas y la sociedad, considerando sus causas, consecuencias y alternativas de prevención y mitigación.
- Analizar estrategias y soluciones de desarrollo sostenible, relacionándolas con los ODS, la responsabilidad social y su aplicación en el ámbito arquitectónico.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

AG-A13) Demonstrates knowledge of the means to achieve ecologically responsible design and environmental conservation and rehabilitation. (Usage)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Ecología: definición, objeto de estudio e importancia. Principios y conceptos fundamentales. Niveles de organización ecológica: individuo, población, comunidad, ecosistema y biosfera. Relación entre los seres vivos y su ambiente: factores bióticos y abióticos. • Ecosistema: definición, estructura y componentes. Tipos de ecosistemas y sus características. Ecosistemas del Perú: costeros, andinos y amazónicos. • Biodiversidad: concepto, niveles e importancia. Hábitat y nicho ecológico. Relaciones ecológicas entre los seres vivos. • Flujo de materia y energía en los ecosistemas. Ciclos biogeoquímicos: agua, carbono y oxígeno. Interacción humana y alteración de los ecosistemas. Uso y agotamiento de los recursos naturales.	• Analiza la ecología: definición, objeto de estudio e importancia, y los niveles de organización ecológica (individuo, población, comunidad, ecosistema y biosfera). [Usar]. • Identifica componentes de los ecosistemas, reconoce ecosistemas del Perú (costeros, andinos y amazónicos) y analiza las relaciones bióticas y abióticas. [Usar]. • Identifica niveles de biodiversidad, diferencia hábitat y nicho ecológico, y analiza la importancia de la biodiversidad para el equilibrio de los ecosistemas. [Usar]. • Interpreta ciclos biogeoquímicos (agua, carbono y oxígeno), identifica impactos de la interacción humana sobre los ecosistemas y analiza el uso y agotamiento de los recursos naturales. [Usar].
Readings : [**Malacalza2013**], [**Begon2021**]	

Unit 2: (21 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Problemática ambiental: concepto y características. Relación entre las actividades humanas y el ambiente. Principales problemas ambientales globales y locales. • Cambio climático: definición y causas. Efecto invernadero y calentamiento global. Consecuencias del cambio climático. Adaptación y mitigación. ODS 13: Acción por el clima. • Contaminación ambiental: concepto, tipos y fuentes. Contaminación del aire, agua y suelo. Residuos sólidos: clasificación, manejo, reciclaje y reutilización. • Recursos naturales: clasificación y características. Uso, sobreexplotación y agotamiento. Recursos hídricos del Perú. Deforestación, sobrepesca, sobreexplotación minera, desertificación y erosión. • Ecorregiones del Perú y problemática ambiental. Áreas Naturales Protegidas. Política y legislación ambiental en el Perú.	• Analiza lecturas sobre problemática ambiental, identificando problemas ambientales globales y locales y la relación entre las actividades humanas y el ambiente. [Usar]. • Diferencia entre cambio climático y calentamiento global, identificando causas y consecuencias, y relacionándolo con el ODS 13 (acción por el clima). [Usar]. • Identifica fuentes y tipos de contaminación (aire, agua y suelo), reconoce focos contaminantes y propone medidas de prevención y control. [Usar]. • Clasifica los recursos naturales e identifica problemáticas ambientales del Perú (deforestación, sobrepesca, sobreexplotación minera, desertificación, erosión). [Usar]. • Identifica problemáticas ambientales en las ecorregiones del Perú y analiza instrumentos de política y legislación ambiental, incluyendo las Áreas Naturales Protegidas. [Usar].
Readings : [**IPCC2023**], [**MinisterioDelAmbiente2024**]	

Unit 3: (18 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Desarrollo sostenible: definición, principios e importancia. Diferencia entre sostenibilidad y desarrollo sostenible. Dimensiones de la sostenibilidad: ambiental, social y económica. Agenda 2030 y Objetivos de Desarrollo Sostenible. Responsabilidad Social Universitaria. • Sostenibilidad aplicada a la arquitectura: arquitectura sostenible y bioclimática. Estrategias pasivas y activas para el diseño sostenible. Eficiencia energética y uso eficiente de recursos. Certificaciones de sostenibilidad en la edificación. • Innovación y sostenibilidad en la vivienda y el entorno urbano: Solar Decathlon. Diseño y construcción de viviendas sostenibles. Buenas prácticas de sostenibilidad aplicables al espacio urbano. • Desarrollo de estrategias de mejora para el espacio urbano estudiado. Sustentación de la investigación y propuesta desarrollada.	• Analiza lecturas relacionadas con desarrollo sostenible, diferenciando sostenibilidad y desarrollo sostenible, e identificando sus dimensiones (ambiental, social y económica). [Usar]. • Identifica estrategias de diseño sostenible y bioclimático, y reconoce estrategias de eficiencia energética y uso responsable de recursos aplicadas a la arquitectura. [Usar]. • Identifica y analiza estrategias y tecnologías sostenibles aplicadas a la vivienda y al entorno urbano (Solar Decathlon), analizando buenas prácticas de sostenibilidad aplicables al espacio urbano. [Usar]. • Desarrolla estrategias de mejora para un espacio urbano estudiado, sustentando una investigación y propuesta de buenas prácticas de sostenibilidad. [Evaluar].
Readings : [**NacionesUnidas2015**], [**DeGarrido2013**]	

8. WORKPLAN

8.1 Methodology

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

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

1. COURSE

EG365. Peru's Problems and Challenges in a Global World (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	EG365. Peru's Problems and Challenges in a Global World
2.2 Semester	:	4^{th} Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Problemas y Desafíos del Perú en un Mundo Global pertenece al Área de Estudios Generales, es de carácter obligatorio y de naturaleza teórica. Tiene como propósito la comprensión de los problemas sociopolíticos que enfrenta el Perú y que son desafíos para su desarrollo y progreso, en el contexto de la sociedad global del siglo XXI. Comprende el Estado peruano y la gobernabilidad, el desarrollo político y la democracia, los regímenes políticos, el Estado y la crisis de representatividad, la economía social de mercado y la corrupción, la diversidad social y las brechas y desigualdades, y los procesos de producción, inflación, globalización y comercio internacional.

5. GOALS

- Identificar las principales características del territorio y los recursos naturales del Perú, y analizar los principales problemas sociales de su entorno en relación con las metas de los Objetivos de Desarrollo Sostenible de la ONU.
- Analizar la naturaleza de los regímenes políticos y su relación con la gobernabilidad, y la problemática de la corrupción y su impacto en la economía.
- Analizar la producción nacional y los sectores clave para el desarrollo del país, y evaluar los indicadores de la globalización y los elementos del comercio internacional.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

7. TOPICS

Unit 1: (15 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Realidad nacional: definiciones, población, megadiversidad, ecología, identidad, soportes de la cultura. • Responsabilidad social: definiciones, elementos, agentes, normativa, responsabilidad social empresarial. Objetivos de Desarrollo Sostenible de la ONU. Planificación: políticas, elementos. • Sociedad: orígenes, fases de la socialización, agentes. Diversidad cultural. Procesos migratorios internos y externos: migración del campo a la ciudad, migraciones internacionales, efectos y problemas actuales. • Diversidad social: brechas, discriminación y desigualdades; género, personas con habilidades diferentes y población adulto mayor.	• Reconoce la gran variedad de la biodiversidad e identidad cultural del país, a través de talleres y estudios de caso sobre realidad nacional. [Usar]. • Comprende el compromiso de individuos e instituciones con la sociedad en el logro de las metas de los ODS N.º 3 y N.º 13 de la ONU, elaborando un plan de responsabilidad social. [Usar]. • Reconoce los agentes de socialización y su influencia, y analiza los procesos migratorios internos y externos y sus efectos. [Usar]. • Identifica brechas, discriminación y desigualdades sociales, incluyendo las variables de género, discapacidad y adulto mayor, elaborando una monografía sobre realidad nacional, sociedad y responsabilidad social. [Usar].
Readings : [**AmatYLeon2012**], [**Hurtado2021**]	

Unit 2: (21 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Regímenes políticos: definiciones, características, partidos políticos, ideologías. Problemática de los partidos políticos. • Estado: estructura, agentes, funciones, gobiernos. Gobernabilidad. Las instituciones del Estado y la crisis de representatividad. • Economía social de mercado: definición, políticas económicas, instrumentos y agentes. • Políticas aplicadas en diferentes gobiernos: efectos y consecuencias. Avances en democracia y gobernanza democrática en el mundo globalizado y desafíos para el Perú. • La corrupción: definición, características, consecuencias sociales. Implicancias y retos para enfrentar la corrupción.	• Identifica las características y elementos de los regímenes políticos y sus ideologías, y analiza la problemática de los partidos políticos mediante taller y resolución de casos. [Usar]. • Identifica la estructura del Estado peruano, la participación de los partidos políticos, y analiza la crisis de representatividad institucional mediante talleres y estudios de caso. [Usar]. • Analiza el modelo económico del Perú (economía social de mercado) y los instrumentos de las políticas económicas, mediante taller y resolución de casos sobre economía. [Usar]. • Analiza los distintos gobiernos, sus políticas, formas de gobierno y los avances en gobernanza democrática, elaborando una monografía sobre regímenes políticos, economía y corrupción. [Usar]. • Analiza las consecuencias económicas y sociales de la corrupción y los retos para enfrentarla, mediante taller y resolución de casos sobre corrupción. [Usar].
Readings : [**Durand2018**], [**Parodi2022**]	

Unit 3: (18 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Producción: definiciones, fases, sectores productivos, el empleo, agentes. • Inflación: definiciones, clasificación. • La globalización: definiciones, etapas, internacionalización. Comercio exterior e internacional: definiciones, características, importaciones y exportaciones.	• Analiza las fases de la producción y los sectores clave que generan ingresos y desarrollo al país, mediante talleres sobre producción. [Usar]. • Analiza las causas de un proceso inflacionario, mediante taller sobre inflación. [Usar]. • Evalúa la realidad del Perú frente a la globalización e identifica los principales productos negociados mediante importaciones y exportaciones, entregando una monografía final sobre producción, inflación, globalización y comercio internacional. [Evaluar].
Readings : [**Krugman2012**], [**Rios2010**]	

8. WORKPLAN

8.1 Methodology

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

1. COURSE

AR2B3. BIM Scheduling and Cost (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2B3. BIM Scheduling and Cost
2.2 Semester	:	5^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2B2. BIM Execution Planning. (4^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

BIM Scheduling and Cost is the fifth course of the mandatory BIM I-X sequence, building directly on the authoring and multidisciplinary coordination skills developed through AR2B2. It moves the student from a purely geometric and coordination-oriented use of the BIM model into its project-controls dimension: linking the model to time (4D scheduling) and cost (5D estimating), and then overlaying Lean Construction management principles – the Last Planner System and pull planning – onto that linked model to improve the reliability of construction sequencing. This course is what equips students to use BIM not just to design and coordinate a building, but to plan, cost, and manage its actual construction, preparing them for the professional-practice and construction-administration content later in the curriculum.

5. GOALS

- Use 4D BIM to link model elements to a construction schedule, producing sequencing simulations for constructability review and stakeholder communication.
- Extract quantities from a BIM model and link them to unit costs to produce model-based 5D cost estimates across design iterations.
- Apply Lean Construction principles – Last Planner System and pull planning – integrated with a 4D BIM schedule to reduce waste and improve the reliability of construction sequencing.
- Build proficiency in BIM scheduling, cost-estimation, and coordination software through a guided, certification-aligned practicum.

6. COMPETENCES

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

AG-A14) Possesses creative capacity in construction techniques, grounded in a comprehensive understanding of the disciplines and construction methods related to architecture. (Usage)

7. TOPICS

Unit 1: 4D BIM and Construction Scheduling (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• 4D BIM and construction scheduling: linking BIM elements to Gantt chart activities in Synchro or Navisworks TimeLiner • Construction sequencing simulation: visualizing phased construction, logistics, and site congestion through 4D animation for stakeholder communication and constructability review	• Describe the concept of 4D BIM and explain how linking model elements to schedule activities supports construction planning and communication [Familiarity] • Link a BIM model's elements to a construction schedule to produce a 4D sequencing simulation for a building project [Usage] • Evaluate a 4D construction sequencing simulation for its accuracy, clarity, and usefulness in identifying logistics or site-congestion problems [Assessment]
Readings : [IFO03]	

Unit 2: 5D BIM and Cost Estimation (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Model-based quantity takeoff and cost estimation: automated schedule extraction from BIM elements, level of development (LOD) requirements for cost estimation • 5D cost modeling: linking BIM quantities to unit costs for real-time budget tracking across design iterations, and change-order cost impact analysis	• Describe how BIM-based quantity takeoff supports cost estimation, and explain the relationship between model LOD and estimate accuracy [Familiarity] • Extract quantities from a BIM model and link them to unit costs to produce a model-based cost estimate for a design option [Usage] • Evaluate a 5D cost model for completeness and accuracy, identifying quantities that are missing, duplicated, or misclassified [Assessment]
Readings : [Eas+18]	

Unit 3: Lean Construction and 4D BIM Integration (24 hours)	
Competences Expected: AG-A05,AG-A14	
Topics	**Learning Outcomes**
• Last Planner System: pull planning, weekly work plans, and percent-plan-complete (PPC) tracking, and its integration with a 4D BIM schedule • Collaborative pull-planning sessions using 4D BIM visualizations to sequence trade work and identify constraints before they cause delay • Lean waste-reduction principles (overproduction, waiting, rework) applied to BIM-coordinated construction workflows	• Describe the Last Planner System and explain how linking it to a 4D BIM schedule improves the reliability of construction sequencing [Familiarity] • Run a pull-planning exercise supported by a 4D BIM visualization, producing a weekly work plan and identifying constraints [Usage] • Evaluate a Lean-BIM construction plan for its percent-plan-complete tracking and its effectiveness at surfacing constraints before they cause delay [Assessment]
Readings : [TKK20]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [HM15]	

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

[IFO03] Raja R. A. Issa, Ian Flood, and William J. O'Brien, eds. *4D CAD and Visualization in Construction: Developments and Applications*. 1st. A.A. Balkema Publishers, 2003.

[HM15] Brad Hardin and David McCool. *BIM and Construction Management: Proven Tools, Methods, and Workflows*. 2nd. Sybex, 2015.

[Eas+18] Chuck Eastman et al. *BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors*. 3rd. Wiley, 2018.

[TKK20] Patricia Tzortzopoulos, Mike Kagioglou, and Lauri Koskela, eds. *Lean Construction: Core Concepts and New Frontiers*. 1st. Routledge, 2020.

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

1. COURSE

AR2D2. Design Studio V (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2D2. Design Studio V
2.2 Semester	:	5^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2D1. Design Studio IV. (4^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio V: Educational/Cultural Building develops a medium-scale building with a markedly more complex program than Design Studio IV (AR2D1, prerequisite) – a school, library, or small cultural center – in which an explicit long-span structural system and a deliberately performance-driven design process generate, rather than merely accommodate, the architectural proposal. The studio asks students to resolve daylight, acoustic, and mechanical comfort criteria for spaces with specific performance requirements (classrooms, auditoria, galleries), and to detail a high-performance building envelope that supports those criteria. This course is the foundation for Design Studio VI (AR2D3).

5. GOALS

- Design a long-span structural system (trusses, arches, shells, or space frames) appropriate to the spatial requirements of a mid-sized educational or cultural building.
- Integrate environmental and structural performance criteria as generative drivers of the design proposal from the earliest design stages.
- Design apertures and shading for adequate daylight performance in classrooms, galleries, and other program-specific spaces.
- Resolve acoustic performance requirements (reverberation, isolation) appropriate to the program's specific spaces.
- Select and coordinate mechanical (HVAC) systems with the architectural design.
- Detail a high-performance building envelope that supports the building's daylight, thermal, and acoustic performance goals.

6. COMPETENCES

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A11) Demonstrates knowledge of the physical problems and technologies that allow buildings to provide internal comfort and protection within environmental parameters. (Usage)

AG-A14) Possesses creative capacity in construction techniques, grounded in a comprehensive understanding of the disciplines and construction methods related to architecture. (Usage)

7. TOPICS

Unit 1: Long-Span and Special Structures (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Arches and vaults: funicular compression geometry, buttressing requirements, ribbed vs. continuous vaults, and historic and contemporary applications (Guastavino, Candela) • Domes and shells: membrane theory, edge ring forces, buckling in thin shells, geodesic domes (Fuller), and reinforced concrete shells (Nervi, Isler) • Space frames and long-span trusses: three-dimensional truss action, node design, modular systems (Mero, Unistrut), and application in arenas, airports, and exhibition halls • Tensile and cable structures: cable nets (Frei Otto), fabric membranes (PTFE-coated fiberglass, ETFE), masts and anchorage design, and form-finding via physical • Folded plate structures: corrugated geometry for stiffness, folded plate concrete roofs, and timber folded plate systems (CLT folded plates) • Deployable and transformable structures: scissor linkages, pantographic systems, and their application in retractable roofs, emergency shelters, and kinetic architecture	• Describe the principal long-span structural systems - arches, domes, space frames, tensile membranes - and identify the appropriate span range [Familiarity] • Select and conceptualize a long-span structural system for a given program (e.g., stadium, airport terminal, convention center), justifying the choice by span, load, [Usage] • Evaluate the structural efficiency and architectural expression of a built long-span structure, analyzing its load path, stability, and integration of form with structural logic [Assessment]
Readings : [**Schierle2012**]	

Unit 2: Performance-Driven Design (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Integration of performance criteria into early design: using daylighting, solar access, thermal comfort, and structural efficiency as spatial • Simulation-based design feedback: using tools such as Ladybug, Honeybee, and Grasshopper to evaluate energy, daylight, • Passive design strategies: solar shading, natural ventilation, thermal mass, and orientation as architectural design elements that reduce mechanical energy loads • Structural form-finding as design: integrating structural logic (arches, shells, trusses, tensile systems) into spatial and formal decisions from schematic design onward • Building performance metrics and certification frameworks: EUI (energy use intensity), daylight autonomy, thermal comfort indices (PMV, SET), • AI-assisted performance optimization: generative adversarial networks and reinforcement learning for multi-objective design optimization	• Identify the key environmental and structural performance criteria relevant to a design project and describe how they can inform early-stage spatial and formal decisions [Familiarity] • Apply passive design strategies and simulation feedback to develop a performance-informed architectural proposal that meets defined energy and comfort targets [Usage] • Evaluate a building design for environmental and structural performance using simulation outputs and standard metrics, and propose targeted design improvements [Assessment]
Readings : [**Lechner2014**]	

Unit 3: Daylighting and Visual Comfort (8 hours)	
Competences Expected: AG-A11	
Topics	**Learning Outcomes**
• Daylight performance metrics: daylight factor (DF), spatial daylight autonomy (sDA), annual sunlight exposure (ASE), useful daylight illuminance (UDI), and glare indices (DGP, DGI) • Aperture design for daylight: window-to-wall ratio (WWR), head height, sill height, clerestories, sawtooth roofs, light shelves, • Shading integration for glare and cooling: fixed (overhangs, fins, louvers), operable (roller shades, venetian blinds, screens), • Daylight simulation tools: climate-based modeling (Radiance, DIVA, ClimateStudio, Ladybug Tools); annual simulation for LEED and other certification credits • Electric lighting integration: daylight harvesting controls (dimming, stepped switching), task-ambient lighting strategies,	• Describe the principal daylight performance metrics (sDA, ASE, UDI) and explain how they inform aperture and shading design decisions [Familiarity] • Design and simulate a daylighting strategy for a building facade or roof aperture, iterating on WWR, orientation, and shading to meet defined sDA and ASE targets [Usage] • Evaluate a building's daylighting design from simulation outputs, identifying areas of glare or insufficient illuminance [Assessment]
Readings : [**Lechner2014**]	

Unit 4: Acoustics and Noise Control (8 hours)	
Competences Expected: AG-A11	
Topics	**Learning Outcomes**
• Sound measurement metrics: sound pressure level (SPL, dB), A-weighting (dBA), reverberation time (RT_{60}), sound transmission class (STC), impact insulation class (IIC), • Absorption and diffusion: porous absorbers (fiberglass, foam), resonant absorbers (perforated panels, membrane), and diffusers (quadratic residue, binary amplitude) • Sound isolation and flanking paths: mass-law, double-wall and decoupled assemblies, sealed penetrations, gasketed doors, floating floors, • Room acoustic design: calculating RT_{60} from volume and absorption, early decay time (EDT), clarity (C50, C80), and speech intelligibility (STI) for auditoria, classrooms, • Noise control from external sources: site planning for noise barriers, facade STC selection based on exterior noise levels (road, rail, air),	• Describe the key acoustic metrics (STC, IIC, RT60, NC) and explain how each influences the design of building assemblies and room finishes [Familiarity] • Design a wall and floor-ceiling assembly to meet a specified STC and IIC rating, detailing flanking path controls and penetrations to achieve target isolation [Usage] • Evaluate a room's acoustic design by calculating its reverberation time and comparing it to recommended values for its intended use (lecture, music, conferencing) [Assessment]
Readings : [**MehtaAcoustics1999**]	

Unit 5: Mechanical Systems (HVAC) (8 hours)	
Competences Expected: AG-A11	
Topics	**Learning Outcomes**
• HVAC system classification: all-air (VAV, CAV, dual-duct), all-water (fan-coil, radiant), air-water (induction), and decentralized (heat pumps, PTAC, split systems) • Thermal zoning and load calculation: zone definition by orientation, occupancy, and use; heating and cooling load components (sensible, latent); peak load vs. part-load performance • Distribution system integration: ceiling plenum depth for ducts, raised floors for underfloor air distribution (UFAD), vertical riser coordination, • Dedicated outdoor air systems (DOAS) and energy recovery: enthalpy wheels, run-around loops, and heat pipes • High-efficiency HVAC technologies: variable refrigerant flow (VRF), chilled beams (active and passive), displacement ventilation, radiant heating and cooling slabs,	• Identify the principal HVAC system types and describe the architectural implications of each in terms of floor-to-floor height, ceiling plenum, mechanical room space, [Familiarity] • Select an appropriate HVAC system type for a building program and climate zone, integrating thermal zoning and distribution layout into the architectural floor plan and section [Usage] • Evaluate the HVAC system layout of a building for efficiency, constructability, and architectural integration [Assessment]
Readings : [**Lechner2014**]	

Unit 6: Facade and Building Envelope Technology (12 hours)	
Competences Expected: AG-A14	
Topics	**Learning Outcomes**
• Envelope performance criteria: thermal transmittance (U-value), solar heat gain coefficient (SHGC), air infiltration, acoustic transmission loss, • Glazing systems: double and triple glazing, low-e coatings, electrochromic and thermochromic glass, structural silicone glazing, and point-fixed glazing • Curtain wall and rainscreen systems: pressure-equalized rainscreen principle, back-ventilated facades, unitized curtain wall panels, and the detailing of movement joints • Insulation and airtightness: continuous insulation strategies for thermal bridge elimination, air barrier systems, blower-door testing, and Passivhaus envelope standards • Opaque wall systems: masonry veneer, EIFS, precast concrete panels, metal panels, and fiber cement; fire rating, moisture management, and structural attachment for each system • Responsive and dynamic facade systems: kinetic facades (louvered, origami, pneumatic), electrochromic and BIPV panels, and media facades	• Describe the main types of building envelope systems and their performance characteristics, including thermal, moisture, acoustic, and solar control properties [Familiarity] • Select and detail an appropriate building envelope system for a specific climate and building program, justifying the choice in terms of performance, cost, and constructability [Usage] • Evaluate a facade design for thermal, moisture, and solar performance, identifying deficiencies in detailing and proposing improvements to meet defined performance targets [Assessment]
Readings : [**AllenIano2019**]	

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

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

1. COURSE

ID202. Technical and professional English IV (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	ID202. Technical and professional English IV
2.2 Semester	:	5^{th} Semester.
2.3 Credits	:	2
2.4 Hours	:	1 HT; 2 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	:	ID201. Technical and professional English III. (4^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

At the intermediate level, students apply English to the full range of technical communication required in computing and engineering practice: reading research papers, writing structured technical documents, analyzing case studies, and engaging in professional dialogue. Grammar structures are taught through authentic computing and engineering contexts, reinforcing both linguistic competence and disciplinary knowledge.

5. GOALS

- Develop the ability to write and read structured technical documents in English.
- Bring the student to a more fluent and natural expression in technical and scientific English.
- Master vocabulary for computing, systems engineering, and applied sciences.

6. COMPETENCES

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

7. TOPICS

Unit 1: Best Practices and Ethics (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Modals of obligation and advice: Should, Must, Have to in engineering codes. • Prohibition and absence of obligation in software licensing and data privacy. • Vocabulary: Professional ethics, intellectual property, responsible AI. • Writing: Formal technical recommendation and policy documents.	• By the end of the unit, students correctly use modal auxiliaries to express engineering standards, ethical obligations, and professional recommendations in formal technical environments.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 2: Failures and Root Causes (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Past Perfect: Structure and use in root cause analysis and post-mortems. • Contrast between Simple Past, Continuous, and Perfect in failure timelines. • Vocabulary: System outages, security breaches, cascading failures. • Expressions for reporting information: reported speech in incident briefings.	• Students reconstruct complex failure timelines and root cause analyses by establishing clear chronological sequences through the use of past tense contrasts.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 3: If-Then Logic (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Conditionals Type 0, 1, and 2 applied to computing logic and engineering decisions. • Sentences with "If" and "Unless" for system constraints and requirements. • Vocabulary: Hypothetical scenarios, risk analysis, and optimization trade-offs. • Expressions of what-if design thinking: "If we used X, the system would..."	• Students pose real and hypothetical technical scenarios and their consequences, using conditional structures to reason about design choices and engineering decisions.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 4: Ongoing Research (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Perfect Continuous for describing research in progress. • Contrast between Simple and Continuous Present Perfect in scientific writing. • Vocabulary: Continuous integration, agile development, iterative research. • Word formation: Prefixes and suffixes in scientific and technical terminology.	• Students describe research activities and development processes that began in the past and continue into the present, emphasizing duration and iterative progress.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 5: Manufacturing and Deployment (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Passive Voice in all basic tenses for technical process descriptions. • Verbs with two objects in passive: data is sent to the server by the client. • Vocabulary: Hardware manufacturing, cloud deployment, CI/CD pipelines. • Writing: Technical description of a deployment or production process.	• Students use the passive voice across multiple tenses to describe technical processes where the action, system, or result is the focus rather than the agent.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 6: Tech Roadmaps (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Future Continuous and Future Perfect for project timelines and milestones. • Adverbs of probability: perhaps, probably, definitely — in tech forecasting. • Vocabulary: Product roadmaps, release planning, emerging research areas. • Oral presentations: "The state of AI / quantum computing in 5 years".	• Students project technical states, completed future milestones, and research outcomes, discussing computing and engineering roadmaps with advanced vocabulary.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 7: Technical Teams (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Indirect questions and Tag questions in technical interviews and peer reviews. • Common Phrasal Verbs in engineering and research environments. • Vocabulary: Collaboration tools, code review practices, team roles. • Writing: Short technical blog posts and engineering team updates.	• Students use polite inquiry forms and confirmation strategies in technical interviews and team discussions, improving their fluency and naturalness in professional engineering contexts.
Readings : [SJ02], [Cam06], [Mac99]	

Unit 8: Technical English IV: Networks and Security (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Networking terminology: protocols, topologies, OSI model, routing. • Cybersecurity vocabulary: vulnerabilities, threats, encryption, authentication. • Reading and writing network incident and security audit reports. • Project: Security assessment plan for a computing infrastructure.	• By the end of the course, students command networking and cybersecurity technical terminology to read specialized documentation and communicate effectively with IT and security professionals in English.
Readings : [SJ02], [Cam06], [Mac99]	

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.

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

[Mac99] James MacGrew. *Focus on Grammar Basic*. Editorial Oxford, 1999.

[SJ02] Liz Soars and John. *American Headway N 2 Student Book*. Editorial Oxford, 2002.

[Cam06] Cambridge. *Diccionario Inglés-Espanol Cambridge*. Editorial Oxford, 2006.

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

1. COURSE

AR2D3. Design Studio VI (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2D3. Design Studio VI
2.2 Semester	:	6^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2D2. Design Studio V. (5^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio VI: Mixed-Use Building raises the program and scale complexity introduced in Design Studio V (AR2D2, prerequisite) to a taller, mixed-use building that stacks residential, commercial, and/or civic uses and requires explicit coordination with building systems (structural, envelope, and MEP). Students design a building whose viability depends as much on development feasibility as on architectural resolution, and practice the project-management skills needed to carry a complex proposal from concept through a coordinated construction-ready design. This course is the foundation for the Urban Design Studio sequence that begins with Design Studio VII (AR3D1).

5. GOALS

- Design the programming and spatial organization of a mixed-use building at a scale and complexity greater than any single-use project in the sequence so far.
- Coordinate the structural, envelope, and building-system assemblies of a taller building within realistic floor-to-floor height constraints.
- Select an appropriate seismic lateral-force-resisting system and detail the ductility measures required for a mixed-use building of increased height.
- Evaluate the development feasibility of the proposed building – market, site, regulatory, and financial constraints – as part of the design process.
- Apply project-management principles (scope, schedule, budget) to the development of a complex design proposal.

6. COMPETENCES

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

7. TOPICS

Unit 1: Large-Scale and Complex Buildings (12 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Programming and spatial organization at large scale: stacking diagrams, core-to-perimeter ratios, vertical circulation strategies, • Life safety and means of egress in large buildings: occupancy-based egress design, pressurized stairwells, refuge floors, fire compartmentalization, and NFPA/IBC requirements • Vertical transportation systems: elevator group design, sky lobbies, express/local zone strategies, escalators, and integration of vertical transport into building form • Hybrid and mixed-use building design: separating and linking residential, commercial, hotel, and civic programs; transfer floors, podium strategies, and shared amenity programming • Phased construction and building complexity: designing for construction staging, operational continuity, future expansion, and changeable use within long-lifespan complex buildings • Campus and master plan design at large scale: site organization, wayfinding, public realm, phasing, infrastructure coordination, and identity across a multi-building ensemble	• Identify the key design challenges - program complexity, life safety, vertical transport, and phasing - that distinguish large-scale buildings from smaller architectural projects [Familiarity] • Apply large-scale building design strategies to develop a spatial and programmatic organization for a complex multi-story or mixed-use building typology [Usage] • Evaluate a large-scale building design for programmatic coherence, life safety compliance, and operational efficiency [Assessment]
Readings : [**Schierle2012**]	

Unit 2: Building Systems and Assemblies (10 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Integration of building systems: coordinating structural frame, mechanical/electrical/plumbing (MEP), envelope, and interior fit-out within constrained floor-to-floor heights • Construction documentation for assemblies: details at 1:5, 1:10, and 1:20; section-through-wall details, sill and head conditions, and coordination between architectural • Construction tolerances and coordination: dimensional tolerances in concrete, steel, and masonry; clearances for MEP rough-in • Waterproofing and moisture management: below-grade waterproofing systems, drainage planes, vapor barriers, and flashing at penetrations • Fire-rated assemblies: UL-listed wall, floor, and ceiling assemblies; fire-stopping at penetrations, intumescent seals, and the architectural detailing required by fire codes • Prefabricated and modular assemblies: volumetric modular construction, panelized wall systems, and the design implications of off-site manufacturing tolerances	• Identify the principal building systems and describe how they are integrated and coordinated within a multi-story building assembly [Familiarity] • Develop construction-level details for a building assembly that correctly coordinate structural, envelope, and MEP systems within realistic tolerances and code requirements [Usage] • Evaluate a set of construction documents for assembly coordination quality, identifying conflicts, missing details, and buildability risks [Assessment]
Readings : [**AllenIano2019**]	

Unit 3: Seismic Design for Architecture (10 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Seismic hazards and site effects: fault rupture, ground shaking, liquefaction, landslide; site class effects on ground motion amplification • Lateral force-resisting systems for seismic resistance: moment frames, braced frames (concentric, eccentric), shear walls (reinforced concrete, wood), and dual systems • Ductility and capacity design: strong-column weak-beam, plastic hinge formation, confinement reinforcement in concrete columns, • Architectural integration of seismic systems: drift limits for cladding and partitions, seismic joints, diaphragm continuity, • Base isolation and energy dissipation: elastomeric and sliding bearings, tuned mass dampers, viscous dampers, and their impact on architectural detailing • Performance-based seismic design (PBSD): performance objectives (immediate occupancy, life safety, collapse prevention), nonlinear static pushover analysis,	• Describe the primary seismic force-resisting systems and explain how building codes classify seismic risk and prescribe detailing for ductile behavior [Familiarity] • Apply seismic design principles to the early-stage design of a building, selecting an appropriate lateral system and configuring plan [Usage] • Evaluate an architectural design for seismic vulnerability, identifying plan irregularities (re-entrant corners, diaphragm discontinuities) [Assessment]
Readings : [**Schierle2012**]	

Unit 4: Development Process and Feasibility (10 hours)	
Competences Expected: AG-A12	
Topics	**Learning Outcomes**
• Development phases: site identification, option agreement, due diligence, entitlement (zoning, permits), design • Due diligence for development sites: title review, environmental assessment (Phase I and II), geotechnical investigation, zoning analysis, utility availability, • Entitlements and permitting: land use approvals (rezoning, variances, conditional use permits), building permits, impact fees (school, traffic, parks) • Feasibility study components: market support, site suitability, regulatory pathway, construction feasibility, financial pro forma (with sensitivity analysis), • Real estate pro forma basics: projected net operating income (NOI = gross potential rent minus vacancy allowance minus operating expenses), debt service coverage ratio (DSCR),	• Describe the major stages of the real estate development process - predevelopment, construction, lease-up, disposition - and the due diligence [Familiarity] • Prepare a feasibility study for a proposed development, including market analysis, site due diligence summary, entitlement pathway, construction cost estimate, [Usage] • Evaluate a development pro forma for financial viability, identifying understated risk (vacancy, construction contingency) [Assessment]
Readings : [**MilesBerensWeiss2007**]	

Unit 5: Project Management and Construction Economics (8 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Project management phases: initiation, planning, execution, monitoring/controlling, close-out; work breakdown structure (WBS), Gantt charts, critical path method (CPM), • Cost estimation methods: order-of-magnitude, schematic, design development, and construction document estimates • Value engineering (VE) in architecture: function analysis, cost-performance trade-offs, life cycle costing • Risk management for architectural projects: identifying design risks (code compliance, constructability), professional liability risks (errors and omissions), • Construction specifications: MasterFormat divisions (CSI), section organization (part 1: general, part 2: products, part 3: execution) • Construction quality management: quality plans and inspection/test plans (ITPs) aligned with ISO 9001, non-conformance reports (NCRs) and corrective actions, and compilation of the quality dossier (material certifications, test reports, inspection records, as-built verification) for project close-out	• Describe the key project management activities for an architectural project: scheduling, cost estimating, value engineering, risk management, and quality management, [Familiarity] • Prepare a project schedule (Gantt chart) for a design project, linking deliverables to phases, and produce a schematic-level cost estimate using assembly-based unit costs [Usage] • Evaluate a project's budget and schedule performance against the baseline, using earned value management (EVM) metrics to identify cost or schedule overruns [Assessment]
Readings : [**Hendrickson1998**]	

8. WORKPLAN

8.1 Methodology

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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.

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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

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

1. COURSE

AR3B1. Structural and MEP Coordination (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3B1. Structural and MEP Coordination
2.2 Semester	:	6^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2B3. BIM Scheduling and Cost. (5^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Structural and MEP Coordination is the sixth course of the ten-course BIM I-X sequence (AR1B1 to AR4B1), following BIM Scheduling and Cost (AR2B3, prerequisite). Having established scheduling, cost, and lean-construction habits on the federated model, students now turn the coordination skills built earlier in the sequence (Multidisciplinary Coordination, AR2B1) toward the structural and MEP disciplines specifically: exchanging models with structural analysis and MEP routing software, resolving the spatial conflicts that generate RFIs on real projects, and developing those coordinated models to fabrication-level detail (LOD 400) for shop drawings and prefabrication. The course also introduces systematic model quality control – auditing and parameter validation – as the discipline that makes every later coordination and federation step on the sequence's models trustworthy. As in every course of the sequence, the transversal Practicum unit gives students graded, guided exercises in the structural/MEP and fabrication-detailing software this course's theme requires, preparing them for the course that follows, Sustainability and Circular Economy (AR3B2).

5. GOALS

- Coordinate a federated BIM model's structural and MEP elements, identifying and resolving spatial conflicts between systems using IFC/CIS2 data exchange.
- Develop structural connection and MEP routing details to fabrication-level (LOD 400), producing shop-drawing-ready models for steel, precast, and prefabricated MEP assemblies.
- Run systematic model-auditing and parameter-validation routines on a BIM model, correcting naming, data, and modeling-quality issues before it is shared or federated.
- Build hands-on proficiency in the course's structural/MEP coordination and fabrication-detailing software through a sequence of guided, graded practicum exercises culminating in a cumulative deliverable.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A14) Possesses creative capacity in construction techniques, grounded in a comprehensive understanding of the disciplines and construction methods related to architecture. (Usage)

7. TOPICS

Unit 1: BIM for Structural and MEP Coordination (24 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• BIM-based structural workflows: structural analysis model from architectural BIM (Revit, Tekla), data exchange via IFC or CIS/2 • MEP systems coordination in BIM: routing and clash-avoidance for HVAC ducts, plumbing, and electrical conduit within a federated model; spatial coordination with structural and architectural elements	• Describe the BIM-based workflow for exchanging a model between architectural, structural, and MEP software, and explain the role of IFC/CIS2 in that exchange [Familiarity] • Coordinate a federated model's structural and MEP elements, identifying and resolving spatial conflicts between systems [Usage] • Evaluate a structural/MEP-coordinated BIM model for spatial conflicts, data-exchange integrity, and coordination completeness [Assessment]
Readings : [Sac+18]	

Unit 2: Fabrication-Level BIM Detailing (24 hours)	
Competences Expected: AG-A14	
Topics	**Learning Outcomes**
• Structural fabrication detailing: connection design, rebar detailing, and steel/precast shop-drawing-level modeling (Tekla, Advance Steel) • MEP fabrication modeling: spool drawings for ductwork and piping, prefabrication-ready routing, and hanger/support detailing at LOD 400 • Coordinating fabrication-level models with offsite prefabrication schedules and delivery logistics	• Describe the difference between a construction-level (LOD 350) and a fabrication-level (LOD 400) structural or MEP model, and identify the detailing each requires [Familiarity] • Develop a structural connection or MEP routing detail to fabrication-level (LOD 400), ready for shop-drawing production [Usage] • Evaluate a fabrication-level BIM model for the completeness and buildability of its connection and routing details [Assessment]
Readings : [Kol03]	

Unit 3: BIM Model Quality Control and Auditing (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Model auditing tools and routines: automated checks for unnamed/duplicate elements, orphaned families, and file size/performance issues • Parameter and naming-convention validation: checking that model elements carry the required parameters and follow the project's naming standards before federation • Automated rule-checking scripts (Dynamo, Solibri rulesets) for enforcing modeling standards across a large or multi-author model	• Describe the kinds of modeling and data errors a BIM quality-control audit is designed to catch, and why they matter before model federation [Familiarity] • Run a model audit on a BIM file, identifying and correcting naming, parameter, and modeling-quality issues before sharing it with the project team [Usage] • Evaluate a model's audit report to judge whether it is ready for federation and coordination, or requires further cleanup [Assessment]
Readings : [Ken14]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [Win12]	

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

[Kol03] Branko Kolarevic. *Architecture in the Digital Age: Design and Manufacturing*. 1st. Spon Press, 2003.

[Win12] Eric Wing. *Autodesk Revit MEP: No Experience Required*. 1st. Sybex, 2012.

[Ken14] Karen M. Kensek. *Building Information Modeling*. 1st. Routledge, 2014.

[Sac+18] Rafael Sacks et al. *BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers*. 3rd. Wiley, 2018.

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

1. COURSE

ID203. Technical and professional English V (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	ID203. Technical and professional English V
2.2 Semester	:	6^{th} Semester.
2.3 Credits	:	2
2.4 Hours	:	1 HT; 2 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	:	ID202. Technical and professional English IV. (5^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. In the engineering and computing career, technical English is the most critical tool for accessing the forefront of knowledge and research, writing scientific papers, participating in international conferences, and collaborating in global teams. This course brings students to the level of autonomous technical communicators capable of producing and critically evaluating academic and professional content.

5. GOALS

- Increase the ability and fluency to communicate complex technical ideas in English.
- Ensure that students interact with emphasis on scientific argumentation and advanced technical writing.
- Master vocabulary for software engineering, data science, and systems research.

6. COMPETENCES

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

7. TOPICS

Unit 1: Scientific Argumentation (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Advanced review of auxiliary verbs and verb tenses in academic writing. • Negative questions and emphatic answers in scientific debate. • Word formation: Prefixes and suffixes common in computing and science. • Correcting misconceptions: Refuting claims in technical discussions.	• By the end of the unit, students use auxiliaries and tenses precisely to construct scientific arguments, challenge erroneous technical claims, and engage in structured academic debate.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 2: Research Methodology (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Simple vs. Present Continuous: Distinguishing general facts from ongoing experiments. • State verbs and action verbs in experimental descriptions. • Vocabulary: Research design, experimental variables, data collection methods. • Writing: Description of a research method or experimental procedure.	• Students differentiate between stative and progressive uses to accurately describe scientific laws, ongoing experiments, and research methodologies in computing and engineering.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 3: Case Studies (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Narrative tenses: Simple Past, Past Continuous, and Past Perfect in case study analysis. • Structure of "Used to" and "Would" for describing legacy systems and past practices. • Vocabulary: Historical computing cases, paradigm shifts, engineering lessons learned. • Writing: Structured case study report on a computing incident or innovation.	• Students analyze and narrate sequences of technical events and historical computing cases fluently, applying narrative tenses correctly in professional case study reports.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 4: Research Proposals (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Predictions and plans: Future tense review for academic proposal writing. • Future Continuous and Future Perfect in project scope and outcomes. • Vocabulary: Research objectives, expected contributions, scope and limitations. • Writing: Short research proposal or technical project abstract.	• Students project research goals and anticipated outcomes, and make evidence-based predictions about the evolution of technology using appropriate future forms in formal academic writing.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 5: Technical Documentation (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Verb patterns (Verbs followed by -ing or infinitive) in instructional writing. • Expressions with "Like" for analogies and technical comparisons. • Vocabulary: API documentation, user manuals, technical specifications. • Debates: Standards for open-source documentation and reproducibility.	• Students use complex verb patterns to write clear, precise technical documentation and use analogical reasoning to explain technical concepts to diverse audiences.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 6: Long-term Projects (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Present Perfect Continuous vs. Simple Present Perfect in research progress reports. • Modal verbs of deduction (Present and Past) for interpreting experimental results. • Vocabulary: Long-running systems, sustained research programs, startup development. • Oral presentations: "Progress report on a computing research project".	• Students discuss long-term research and development activities, make deductions about technical outcomes, and present progress reports on computing projects with appropriate academic register.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 7: Advanced Technical Writing (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Relative clauses (Defining vs. Non-defining) in technical paper writing. • Advanced passive voice in formal scientific and engineering prose. • Vocabulary: Peer review, impact factors, citation practices, open access. • Writing: Abstract and introduction section of a computing research paper.	• Students write precise, well-structured technical and scientific texts using relative clauses and advanced passive constructions to add depth and clarity to research writing.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

Unit 8: English for Software Engineering (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Agile Methodologies: Scrum, Kanban, and XP terminology in English. • QA (Quality Assurance) and Testing: Test plans, bug reports, acceptance criteria. • Software requirements documentation: user stories, use cases, specifications. • Simulation: Technical team meeting (Sprint planning and retrospective).	• By the end of the course, students command software engineering and project management terminology, can produce professional technical documents, and actively participate in international technical meetings and reviews in English.
Readings : [SJ02a], [SJ02c], [SJ02b], [Cam06], [Mac99]	

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

[Mac99] James MacGrew. *Focus on Grammar Basic*. Editorial Oxford, 1999.

[SJ02a] Liz Soars and John. *American Headway N 3 Student Book*. Editorial Oxford, 2002.

[SJ02b] Liz Soars and John. *American Headway N 3 Teachers Book*. Editorial Oxford, 2002.

[SJ02c] Liz Soars and John. *American Headway N 3 Work Book*. Editorial Oxford, 2002.

[Cam06] Cambridge. *Diccionario Inglés-Espanol Cambridge*. Editorial Oxford, 2006.

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

1. COURSE

AR3B2. Sustainability and Circular Economy (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3B2. Sustainability and Circular Economy
2.2 Semester	:	7^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3B1. Structural and MEP Coordination. (6^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Sustainability and Circular Economy is the seventh course of the ten-course BIM I-X sequence (AR1B1 to AR4B1) that runs obligatorily alongside the Design Studio and Representation lines across the whole program. Building on Structural and MEP Coordination (AR3B1, prerequisite), where students consolidated model-based coordination and delivery practice, this course turns the BIM model into the data source for a building's environmental performance: exporting model geometry and materials to energy and daylight analysis tools, tagging model elements for circular-economy strategies such as design-for-disassembly and material passports, and tracking a project's compliance with green-building certification systems (LEED, EDGE, BREEAM) directly from model data and generating the corresponding documentation. The course's transversal Practicum unit – a hands-on software-lab component that recurs, unchanged in structure, across all ten courses of the sequence – shifts its guided exercises and certification-aligned practice to the sustainability-analysis and certification-tracking tools relevant to this course's theme.

5. GOALS

- Export a BIM model's geometry and material data to run energy and daylight analyses, and use the results to inform design iterations.
- Tag a BIM model's elements with material-passport and design-for-disassembly data to support a future deconstruction or reuse scenario.
- Track a chosen set of green-building certification credits (LEED, EDGE, or BREEAM) against a BIM model's quantities and analysis results, and generate the supporting compliance documentation.
- Build hands-on proficiency in the course's BIM sustainability-analysis and certification-tracking tools through a sequence of guided, graded practicum exercises culminating in a cumulative deliverable.

6. COMPETENCES

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

AG-A13) Demonstrates knowledge of the means to achieve ecologically responsible design and environmental conservation and rehabilitation. (Usage)

7. TOPICS

Unit 1: BIM for Sustainability Analysis (24 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• BIM-integrated energy analysis: gbXML export from BIM authoring tools to energy-simulation engines, and iterative design-stage energy performance feedback • BIM-integrated daylight and solar analysis: linking BIM massing and material data to daylight simulation (Insight, IES-VE) and solar-access studies • Embedding sustainability data in BIM objects: embodied-carbon data (EPDs) and material-passport information attached to BIM elements for lifecycle assessment	• Describe how BIM models can be exported or linked to energy, daylight, and sustainability-analysis tools, and explain the data requirements for each [Familiarity] • Export a BIM model's geometry and material data to run an energy or daylight analysis, and use the results to inform a design iteration [Usage] • Evaluate a BIM-based sustainability analysis for data accuracy and the appropriateness of its design recommendations [Assessment]
Readings : [Wil18]	

Unit 2: BIM for Circular Economy and Material Reuse (24 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Design-for-disassembly principles embedded in BIM: reversible connections, material separation, and modeling components for future deconstruction • Material passports and material banks: tagging BIM elements with reuse potential, provenance, and end-of-life data for future material recovery • Deconstruction sequencing and planning using a BIM model, mirroring 4D construction scheduling in reverse	• Describe how BIM data (material passports, reversible-connection tagging) can support circular-economy design decisions [Familiarity] • Tag a BIM model's elements with material-passport and design-for-disassembly data to support a future deconstruction or reuse scenario [Usage] • Evaluate a BIM-based circular-economy strategy for a project, judging the completeness of its material-passport data and the feasibility of its deconstruction plan [Assessment]
Readings : [Add06]	

Unit 3: BIM-Supported Green Building Certification (24 hours)	
Competences Expected: AG-A12	
Topics	**Learning Outcomes**
• Certification credit tracking from model data: linking BIM quantities and performance analysis results to LEED, EDGE, or BREEAM credit requirements • Generating certification documentation (narratives, calculations, drawings) directly from BIM model data and schedules	• Describe how BIM model data can be linked to green-building certification credit requirements and documentation [Familiarity] • Track a chosen set of green-building certification credits against a BIM model's quantities and analysis results [Usage] • Evaluate a BIM-based certification compliance package for completeness and consistency with the model it was generated from [Assessment]
Readings : [US 13]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [KN08]	

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

[Add06] Bill Addis. *Building with Reclaimed Components and Materials: A Design Handbook for Reuse and Recycling.* 1st. Earthscan, 2006.

[KN08] Eddy Krygiel and Bradley Nies. *Green BIM: Successful Sustainable Design with Building Information Modeling.* 1st. Sybex, 2008.

[US 13] U.S. Green Building Council. *LEED v4 Reference Guide for Building Design and Construction.* 1st. USGBC, 2013.

[Wil18] Pieter de Wilde. *Building Performance Analysis.* 1st. Wiley, 2018.

UNIVERSIDAD PRIVADA DE TACNA

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

1. COURSE

AR3D1. Design Studio VII (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3D1. Design Studio VII
2.2 Semester	:	7^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR2D3. Design Studio VI. (6^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Urban Design Studio VII: Public Space and Landscape shifts the sequence's scale of operation from the single building, the focus of Design Studio VI (AR2D3, prerequisite), to the city: streets, blocks, public space, and the urban tissue that frames every building the students have designed so far. Students analyze the morphology of an existing urban fabric and the planning frameworks (zoning, master-planning, contemporary urban theory) that shape it, then propose an urban design and landscape intervention at the scale of a public space, a street, or a neighborhood. The course is the foundation for Design Studio VIII (AR3D2), the first of the two more specialized, higher-complexity studios that close the sequence.

5. GOALS

- Analyze the morphology of an existing urban fabric – streets, blocks, plots, and urban typologies – as the basis for an urban design proposal.
- Apply contemporary planning methods and urban theory (zoning, master vs. strategic planning, public participation) to a real urban design problem.
- Design public open space and landscape – parks, plazas, streets – integrating ecological, social, and cultural functions.
- Apply landscape design principles (site analysis, spatial organization, circulation) and the integration of landscape with urban green infrastructure.
- Design across urban design scales – from the regional structure down to the block and the street – applying the design guidelines appropriate to each.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

AG-A13) Demonstrates knowledge of the means to achieve ecologically responsible design and environmental conservation and rehabilitation. (Usage)

AG-A15) Understands the relationship between people, buildings, and their environment, and the need to relate buildings and spaces to human scale and needs. (Usage)

7. TOPICS

Unit 1: Urban Form and Morphology (8 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Kevin Lynch's city image elements: paths, edges, districts, nodes, and landmarks; their role in legibility and wayfinding; application to urban design analysis and intervention • Street, block, and plot systems: typologies (grid, radial, organic, cul-de-sac), block dimensions and permeability, plot subdivision, • Urban building typologies: single-family detached, row house (townhouse), courtyard building, slab, point tower, and linear block • Morphological analysis methods: Conzenian (burgage cycle, fringe belts), space syntax (integration, connectivity, choice), and figure-ground diagrams for reading urban form • Urban fabric layers: plot subdivision history, street network evolution, land use succession, and the persistence of plot boundaries over centuries as a design constraint	• Identify the key morphological elements of a city - streets, blocks, plots, buildings - and describe the relationships among them that define urban character [Familiarity] • Apply morphological analysis tools (figure-ground, space syntax) to an urban sector, identifying its legibility, connectivity, and typological diversity [Usage] • Evaluate the morphological coherence and permeability of a proposed urban design, comparing block sizes, street connectivity, [Assessment]
Readings : [**KropfMorphology2017**]	

Unit 2: Contemporary Planning Methods and Theory (10 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Planning methods: zoning (Euclidean, form-based, performance-based), master planning vs. strategic planning, public participation (charrettes, community workshops • Smart growth and new urbanism: principles (transit-oriented development, walkability, mixed-income housing, urban growth boundaries), Andrés Duany's transect, • Contemporary urban theory: Lefebvre's production of space, Harvey's right to the city, Sennett's open city, and the role of informality, participation, • Integration of civil engineering technical constraints (structural, geotechnical, utility infrastructure, and transportation) into urban planning and architectural design frameworks; the collaborative role of civil engineers in multidisciplinary building and urban project teams	• Apply a planning method - such as form-based coding or scenario planning - to a specific urban site, producing land use or built form regulations that align with stated policy [Usage] • Evaluate a current urban plan or zoning code against contemporary planning principles (walkability, mixed-use, transit orientation, social equity), identifying strengths [Assessment]
Readings : [**Jacobs1961**], [**Gehl2010**]	

Unit 3: Urban Design at Multiple Scales (10 hours)	
Competences Expected: AG-A15	
Topics	**Learning Outcomes**
• Regional and city scale: transit corridors, green belts, growth boundaries, satellite towns, and the relationship between density • Neighborhood scale: walkability (5-10 minute walking radius), mixed-use zoning, social infrastructure (schools, clinics, community centers), and the 20-minute neighborhood concept • Block and street scale: block length for pedestrian permeability (80-120 m max), street section design (lane widths, sidewalks, bike lanes, street trees, furniture zone), • Public space design: squares, plazas, parks, pocket parks, and streets as public space; William Whyte's elements of successful public space (sittable space, sun, food • Urban design guidelines: building setbacks, height limits, architectural character, facade articulation, signage, lighting,	• Describe the key design considerations at each urban scale - regional, neighborhood, block, street, and public space - [Familiarity] • Develop a set of urban design guidelines for a specific neighborhood or street typology, integrating density, building height, block length, street section, [Usage] • Evaluate an urban design project for its multi-scale coherence, assessing how well it integrates regional transit, neighborhood walkability, block permeability, street safety, [Assessment]
Readings : [**Lynch1960**]	

Unit 4: Landscape and Open Space Design (8 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Park types and their urban roles: pocket parks, neighborhood parks, district parks, regional parks, linear parks (greenways), waterfront parks, and national urban parks • Green infrastructure in urban design: bioswales, rain gardens, permeable pavements, urban forests, and green roofs • Placemaking for public space: Project for Public Spaces criteria (sociability, uses/activities, access, comfort/image) • Integration of landscape and urban form: view corridors, public space networks, park-to-park connections, and the role of open space in structuring urban density and walkability • Equity in open space access: distributional equity (distance, size per capita), quality equity (facilities, safety, maintenance),	• Describe the typologies of urban open space and their appropriate spatial distribution, programming, and ecological functions [Familiarity] • Design a public open space (plaza, park, or greenway) that integrates stormwater management, seating, shade, and circulation into a coherent spatial composition [Usage] • Evaluate a public space design using placemaking criteria (access, comfort, activities, sociability) and identify modifications to improve its use frequency and user diversity [Assessment]
Readings : [**Booth1983**]	

Unit 5: Landscape Design Principles and Process (10 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Site analysis for landscape: topography (slope, aspect), soils (texture, drainage, fertility), hydrology (surface flow, groundwater, flood zones), vegetation, microclimate (sun • Spatial organization in landscape design: rooms (outdoor rooms), edges (soft vs. hard), sequence (entry, discovery, culmination), focal points (gazebo, sculpture, specimen tree) • Circulation in landscape: primary (vehicular, bike), secondary (pedestrian), service (maintenance), accessible routes (ADA gradients, surface firmness), • Landscape architectural drawing: site plans, grading plans, planting plans, irrigation plans, construction details (walls, paving, water features), • View analysis and visual impact: key views (from building, from approach), framed views, borrowed views, screening of undesirable views, and the use of massing	• Describe the elements of landscape site analysis and the spatial organization principles of outdoor rooms, edges, and circulation [Familiarity] • Produce a landscape design concept for a small site, integrating site analysis data into a spatial layout with defined outdoor rooms, circulation, and focal points [Usage] • Evaluate a landscape design for its responsiveness to site conditions (topography, hydrology, vegetation) and user needs, identifying strengths and weaknesses in circulation [Assessment]
Readings : [**Booth1983**]	

Unit 6: Urban Landscape and Green Infrastructure (8 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Green infrastructure types at urban scale: green roofs (extensive, intensive, biodiverse), rain gardens, bioswales, permeable alleys, street tree trenches, constructed wetlands • Urban forestry: street tree species selection (structural integrity, salt tolerance, root behavior), spacing and placement for shade • Water-sensitive urban design: integrating stormwater management with landscape aesthetics, water reuse for irrigation, • Urban heat island mitigation via landscape: cool pavements (high albedo), shading from street trees and green structures, evapotranspirative cooling from green roofs • Green networks and ecological corridors: connecting parks and open spaces for wildlife movement, integrating greenways along waterways,	• Describe the types of green infrastructure used in urban landscapes - green roofs, rain gardens, bioswales, tree trenches - [Familiarity] • Design a green infrastructure intervention for an urban site (plaza, street, rooftop) that manages a specified stormwater volume, reduces surface temperature, and provides amenity [Usage] • Evaluate the performance of an existing green infrastructure installation against design goals (stormwater capture, plant survival, user acceptance) [Assessment]
Readings : [**Gehl2010**]	

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

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

1. COURSE

AR400. Scientific Research Methodology (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR400. Scientific Research Methodology
2.2 Semester	:	7^{th} Semester.
2.3 Credits	:	3
2.4 Hours	:	3 HT;
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

Scientific Research Methodology opens the research track of the specialization (Methodology – Statistics – Research Workshop – Research Work, ARC400-ARC403), giving every student the common, topic-independent toolkit – epistemology, research design, core quantitative and qualitative methods, theoretical-framework construction – before Research Workshop (ARC402) applies it to each student's own thesis topic and Statistics (ARC401) deepens the quantitative/instrument side. It differs in emphasis from the existing Architecture Research Methodology course (AR400), which focuses on evidence-based design and post-occupancy evaluation specific to buildings; this course instead targets territorial and urban-scale research problems.

5. GOALS

- Compare the epistemological foundations (positivism, interpretivism, critical theory) that underlie different research traditions applied to territorial and urban problems.
- Select and justify a research design (experimental vs. non-experimental; cross-sectional vs. longitudinal) appropriate to a given territorial or urban research question.
- Apply core quantitative research methods – survey design, variable measurement – to territorial and urban problems.
- Apply core qualitative and ethnographic methods – interviews, participatory observation, documentary analysis – to territorial and urban problems.
- Build a coherent theoretical framework (state of the art, conceptual framework) that grounds a research proposal.

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-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Assessment)

7. TOPICS

Unit 1: Research Design and Methodologies (12 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Formulating research questions in architecture: descriptive, relational, causal; turning design problems into researchable questions • Choosing a research methodology: quantitative (hypothesis testing, statistical), qualitative (interpretive, case study), mixed methods, • Validity and reliability in architectural research: internal validity, external validity (generalizability), construct validity, • Research ethics in architectural research: informed consent, privacy (anonymization of building users), institutional review board (IRB) protocols, • Mixed methods research: sequential (qualitative then quantitative) and concurrent designs; integrating qualitative findings (user interviews) with quantitative data (occupancy	• Describe the main research methodologies in architecture - quantitative, qualitative, mixed methods, practice-based - and explain their appropriate applications [Familiarity] • Develop a research design for an architectural inquiry, including research question, literature review, methodology selection, data collection protocol, and analysis plan [Usage] • Evaluate the research design of a published architectural study for validity, reliability, and ethical soundness, identifying methodological strengths and weaknesses [Assessment]
Readings : [CC18], [GW13]	

Unit 2: Theoretical Framework and Literature Review (12 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Systematic search of scientific and technical literature: specialized databases (Scopus, Web of Science, ASCE Library), keywords, and Boolean operators • Critical reading and synthesis of scientific articles, technical standards, and prior research reports • Building the conceptual and theoretical framework: defining key concepts, relationships between variables, and reference theoretical models • Identifying knowledge gaps (research gap) and justifying the originality of the proposed contribution • Bibliographic reference management and citation styles (APA, IEEE) using tools such as Zotero or Mendeley	• Explain the structure and purpose of a theoretical framework within a civil engineering research project [Familiarity] • Conduct a systematic search of scientific and technical literature on a chosen research topic using specialized databases [Usage] • Synthesize the state of the art of a research topic into a coherent theoretical framework that identifies a knowledge gap [Assessment]
Readings : [CC18], [GW13]	

Unit 3: Quantitative Methods in Architectural Research (12 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Survey design for architectural research: sampling methods (probability, convenience), questionnaire design (Likert scales, semantic differential), response rate optimization, • Experimental designs: true experiments (random assignment, control group), quasi-experiments (non-randomized, pre-post, time series), • Descriptive statistics: measures of central tendency (mean, median, mode), dispersion (standard deviation, range, interquartile range), • Inferential statistics: hypothesis testing (t-test, ANOVA, chi-square), correlation and regression (linear, multiple), and interpretation of p-values • Instrumentation for quantitative data collection: environmental sensors (temperature, light, CO_2), occupancy counters, objective performance measures (task completion time	• Describe the main quantitative methods in architectural research - surveys, experiments, quasi-experiments - [Familiarity] • Design a survey or experiment to test a hypothesis about the effect of a design variable (lighting, color, layout) on user satisfaction, task performance, or behavior [Usage] • Evaluate a quantitative architectural study for sampling validity, statistical analysis appropriateness, and correct interpretation of p-values and effect sizes [Assessment]
Readings : [CC18], [Sal17]	

Unit 4: Qualitative and Ethnographic Methods (12 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Interviews and focus groups: structured vs. semi-structured vs. unstructured interviews, focus group dynamics, questioning strategies (probing, laddering), and recording • Ethnography and observation in architecture: participant observation (researcher as user), non-participant observation (fly-on-the-wall), time-sampling behavior mapping, • Content and thematic analysis: coding qualitative data (open coding, axial coding, selective coding), identifying themes • Grounded theory approach in architectural research: generating theory from data rather than hypothesis testing; constant comparative method • Case study methodology in architecture: single vs. multiple case design, case selection (typical, extreme, revelatory), data triangulation (documents, interviews, observations)	• Describe the main qualitative methods in architectural research - interviews, focus groups, ethnography, grounded theory - [Familiarity] • Conduct a qualitative study (interview, observation, or focus group) to investigate how users experience a built space, and analyze the data using thematic coding [Usage] • Evaluate the rigor of a qualitative architectural study based on credibility, transferability, dependability, and confirmability criteria (Lincoln & Guba) [Assessment]
Readings : [CP18], [Cha14]	

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

[GW13] Linda N. Groat and David Wang. *Architectural Research Methods*. 2nd. Wiley, 2013.

[Cha14] Kathy Charmaz. *Constructing Grounded Theory*. 2nd. SAGE Publications, 2014.

[Sal17] Neil J. Salkind. *Statistics for People Who (Think They) Hate Statistics*. 6th. SAGE Publications, 2017.

[CC18] John W. Creswell and J. David Creswell. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th. SAGE Publications, 2018.

[CP18] John W. Creswell and Cheryl N. Poth. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. 4th. SAGE Publications, 2018.

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

1. COURSE

AR3B3. Facilities Management (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3B3. Facilities Management
2.2 Semester	:	8^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3B2. Sustainability and Circular Economy. (7^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Facilities Management is the eighth course in the obligatory BIM I-X sequence, building directly on Sustainability and Circular Economy (AR3B2, prerequisite). Where the first seven courses in the sequence progressively build, coordinate, schedule, cost, and environmentally evaluate a BIM model through design and construction, this course moves the model across the handover threshold into building operations: preparing COBie asset data and as-built models for facilities management, evolving that handover model into a live operational digital twin through IoT sensor integration and predictive-maintenance workflows, and structuring the underlying asset data with industry classification standards (Uniclass, OmniClass) and the COBie schema. A dedicated software practicum, common to every course in the sequence, grounds this theoretical content in guided, certification-aligned exercises. The course prepares students for Heritage and Infrastructure (AR3B4), which extends BIM into heritage documentation, infrastructure, and reality capture.

5. GOALS

- Prepare BIM models and COBie-compliant asset data for handover from construction to a facilities-management team.
- Build and operate a facilities-management digital twin by integrating IoT sensor feeds with an as-built BIM model for condition monitoring and predictive maintenance.
- Classify building assets and structure their operational data using Uniclass/OmniClass and the COBie schema to support interoperable facilities-management handover.
- Demonstrate proficiency in facilities-management-oriented BIM software through a certification-aligned practicum.

6. COMPETENCES

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

7. TOPICS

Unit 1: BIM for Facilities Management (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• BIM handover and facilities management: COBie data for asset management, as-built BIM models, digital twin seeding from construction BIM	• Describe the BIM-to-FM handover process, including COBie data requirements and the role of as-built models in facilities management [Familiarity] • Prepare a COBie data set and as-built BIM model for handover to a facilities-management team [Usage] • Evaluate a BIM-to-FM handover package for completeness and usability, identifying missing asset data or model discrepancies [Assessment]
Readings : [Tei13]	

Unit 2: Operational Digital Twins from BIM (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• IoT sensor integration with an as-built BIM model: mapping sensor feeds (temperature, occupancy, energy use) to model elements and spaces • Predictive-maintenance workflows: using live and historical operational data linked to a digital twin to anticipate equipment failure and schedule maintenance • Building performance dashboards built on digital-twin data for facilities managers and building owners	• Describe how an as-built BIM model becomes a live operational digital twin through sensor integration and ongoing data feeds [Familiarity] • Map a set of IoT sensor feeds to an as-built BIM model's spaces and elements, and build a simple performance dashboard from the resulting data [Usage] • Evaluate a building's digital-twin setup for sensor coverage, data quality, and its usefulness for predictive maintenance [Assessment]
Readings : [Gri11]	

Unit 3: Asset Classification and Data Standards for FM (24 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Asset classification systems: Uniclass and OmniClass structures for organizing building elements and systems for FM use • COBie schema in depth: component, type, system, space, and spare-parts worksheets, and how FM software consumes them	• Describe how classification systems (Uniclass, OmniClass) and the COBie schema structure asset data for facilities management [Familiarity] • Classify a BIM model's assets using a standard classification system, and populate the corresponding COBie worksheets [Usage] • Evaluate an asset data set for correct classification and COBie schema completeness before FM handover [Assessment]
Readings : [Ken14]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [KR24]	

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

[Gri11] Michael Grieves. *Virtually Perfect: Driving Innovative and Lean Products through Product Lifecycle Management*. 1st. Space Coast Press, 2011.

[Tei13] Paul Teicholz. *BIM for Facility Managers*. 1st. Wiley / IFMA, 2013.

[Ken14] Karen M. Kensek. *Building Information Modeling*. 1st. Routledge, 2014.

[KR24] Eddy Krygiel and Phil Read. *Mastering Autodesk Revit 2024*. 1st. Sybex, 2024.

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

1. COURSE

AR3D2. Design Studio VIII (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3D2. Design Studio VIII
2.2 Semester	:	8^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3D1. Design Studio VII. (7^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio VIII: Heritage and Complex Project follows the urban scale of Urban Design Studio VII (AR3D1, prerequisite) with a return to the building scale, now at a markedly higher level of complexity: students choose between the adaptive reuse of a historic building, or a large institutional project, as the specialization axis of this studio. The heritage track introduces the philosophical foundations and documentation methods of architectural conservation, the structural assessment of existing historic fabric, and the design strategies for adapting a historic building to new uses, including circular-economy principles for material reuse. This course is the foundation for Design Studio IX (AR3D3).

5. GOALS

- Apply the philosophical foundations and charters of architectural conservation (authenticity, integrity, minimal intervention) to the evaluation of a historic building or site.
- Document a historic building using appropriate survey methods (measured drawing, photogrammetry, or laser scanning) as the basis for a conservation or reuse proposal.
- Assess the structural condition of an existing historic building using non-destructive testing and monitoring methods.
- Design an adaptive reuse or large-scale institutional proposal that reconciles conservation principles (or complex-program integration) with contemporary programmatic requirements.
- Apply circular-economy principles – material reuse, design for disassembly – to the technical resolution of the design proposal.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

AG-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Usage)

AG-A14) Possesses creative capacity in construction techniques, grounded in a comprehensive understanding of the disciplines and construction methods related to architecture. (Usage)

7. TOPICS

Unit 1: Theory and Philosophy of Conservation (8 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Historic conservation charters: Venice Charter (1964) - principles of minimum intervention, reversibility, anastylosis • Philosophical debate in conservation: Ruskin's anti-restoration (building as ruin), Viollet-le-Duc's stylistic restoration (unity of style), Morris • Core conservation principles: minimum intervention, reversibility, distinguishability of new work, compatibility of materials, documentation, • Values-based conservation: assigning values (historic, aesthetic, social, scientific, economic) and managing change through a conservation management plan • Authenticity and integrity: authenticity of form, material, design, setting, and use; integrity as the intactness of the historic resource • Peru's Ley 28296 (Ley General del Patrimonio Cultural de la Nación): legal protection of heritage-declared buildings and sites, and the Ministerio de Cultura's authorization requirements for interventions on protected fabric	• Describe the key conservation charters (Venice, Burra, Nara) and their principles: minimum intervention, reversibility, authenticity, and cultural significance [Familiarity] • Apply a values-based conservation framework to a historic building or site, identifying its cultural, historic, and social values [Usage] • Critically evaluate a conservation intervention proposal against the principles of the Venice and Burra Charters, assessing it for reversibility, compatibility, [Assessment]
Readings : [**Feilden2003**]	

Unit 2: Adaptive Reuse and Building Transformation (10 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Adaptive reuse strategies: conversion of industrial buildings (warehouse, factory, mill) to residential, office, or cultural use; religious buildings to community space • Designing additions to historic buildings: approach of contrast (Neue Nationalgalerie, Kolumba Museum) vs. • Interior adaptation of heritage buildings: inserting new floors and mezzanines, glazed interior partitions for program separation without structural change, MEP • Material reuse in adaptation: salvaged timber, brick, stone, and fixtures as design features; sourcing from deconstruction • Code compliance in heritage adaptation: equivalency provisions (IBC Chapter 34, existing buildings), alternative means and methods, structural upgrades for seismic,	• Describe the principal strategies for adaptive reuse of industrial, religious, and infrastructural heritage [Familiarity] • Develop an adaptive reuse proposal for a historic building, including program analysis, insertion strategy (interior interventions, addition), [Usage] • Evaluate an adaptive reuse project for its success in balancing heritage conservation with new program requirements, assessing the reversibility [Assessment]
Readings : [**Stubbs2009**]	

Unit 3: Historic Documentation and Digital Survey (8 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Measured drawing of historic buildings: hand measuring (tape, laser distometer) to produce scaled plans, sections, and elevations • Close-range photogrammetry: capturing overlapping images, processing with software (Agisoft Metashape, RealityCapture), generating 3D point clouds, meshes, • Terrestrial laser scanning (TLS): time-of-flight and phase-shift scanners, registration, point cloud processing, and extraction of 2D drawings from 3D point clouds • Drone-based documentation: aerial photogrammetry and LiDAR for roof, facade, and site topography; flight planning, ground control points (GCPs), • Condition assessment and monitoring: mapping decay patterns (efflorescence, spalling, cracking, biological growth) on drawings or point clouds	• Describe the principal methods for documenting historic buildings - measured drawing, photogrammetry, laser scanning, and drone survey - and their appropriate scales [Familiarity] • Produce measured drawings of a historic building or element using hand measurement, photogrammetry, or point cloud extraction, noting areas of material decay [Usage] • Evaluate a documentation survey plan for a historic building, assessing the choice of method (photogrammetry vs [Assessment]
Readings : [**Feilden2003**]	

Unit 4: Structural Assessment of Historic Buildings (8 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Non-destructive testing (NDT) for heritage: rebound hammer, ultrasonic pulse velocity (UPV), moisture meters, endoscopy, thermal imaging, • Small-sample and minimally invasive testing: core sampling for compressive strength, mortar analysis (chemical composition, binder/aggregate ratio), timber dendrochronology, • Structural monitoring of historic buildings: crack monitoring (glass telltales, mechanical gauges, electronic displacement sensors), tilt meters, • Structural modeling for heritage: interpreting historic construction techniques (masonry vaults, timber frames, iron elements), simplified analysis (limit state for masonry), • Decay mechanisms in historic structures: differential settlement, thrust from vaults, water ingress (freeze-thaw, salt crystallization), timber decay (rot, insect attack),	• Describe the principal non-destructive testing methods for historic building assessment and identify the decay mechanisms commonly found in historic masonry, timber, [Familiarity] • Develop a structural assessment plan for a historic building, selecting appropriate NDT and monitoring methods based on materials, decay patterns, and suspected failure mechanisms [Usage] • Evaluate the structural condition of a historic building from monitoring data and on-site observations, diagnosing the likely causes of cracking or deformation [Assessment]
Readings : [**Feilden2003**]	

Unit 5: Large-Scale and Complex Buildings (12 hours)	
Competences Expected: AG-A14	
Topics	**Learning Outcomes**
• Programming and spatial organization at large scale: stacking diagrams, core-to-perimeter ratios, vertical circulation strategies, • Life safety and means of egress in large buildings: occupancy-based egress design, pressurized stairwells, refuge floors, fire compartmentalization, and NFPA/IBC requirements • Vertical transportation systems: elevator group design, sky lobbies, express/local zone strategies, escalators, and integration of vertical transport into building form • Hybrid and mixed-use building design: separating and linking residential, commercial, hotel, and civic programs; transfer floors, podium strategies, and shared amenity programming • Phased construction and building complexity: designing for construction staging, operational continuity, future expansion, and changeable use within long-lifespan complex buildings • Campus and master plan design at large scale: site organization, wayfinding, public realm, phasing, infrastructure coordination, and identity across a multi-building ensemble	• Identify the key design challenges - program complexity, life safety, vertical transport, and phasing - that distinguish large-scale buildings from smaller architectural projects [Familiarity] • Apply large-scale building design strategies to develop a spatial and programmatic organization for a complex multi-story or mixed-use building typology [Usage] • Evaluate a large-scale building design for programmatic coherence, life safety compliance, and operational efficiency [Assessment]
Readings : [**Stubbs2009**]	

Unit 6: Circular and Recycled Materials (8 hours)	
Competences Expected: AG-A14	
Topics	**Learning Outcomes**
• Circular economy in construction: the hierarchy of reuse (refurbish, repurpose, recycle, recover); Ellen MacArthur Foundation framework applied to building materials and components • Design for disassembly: reversible connections (bolted vs. welded, dry vs. wet joints), accessible fasteners, standardized component dimensions, • Material passports and digital product declarations: documenting material composition, structural properties, and reuse potential • Recycled content specifications: recycled steel (EAF vs. BF), recycled concrete aggregate (RCA), reclaimed timber, • Adaptive reuse technical assessment: structural capacity evaluation of existing buildings, floor-to-floor height compatibility for new uses, facade retention feasibility, • Urban mining and deconstruction: selective demolition methodologies, material recovery rates, contamination testing,	• Describe the principles of circular construction, including design for disassembly, material passports, and recycled content specification, [Familiarity] • Apply circular economy principles to a building design, specifying recycled and reclaimed materials and designing connections and assemblies that support future disassembly [Usage] • Evaluate a building design or renovation project for circular economy compliance, scoring it against a material passport framework [Assessment]
Readings : [**EllenMacArthur2019**]	

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

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

1. COURSE

AR401. Statistics and Research Instruments (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR401. Statistics and Research Instruments
2.2 Semester	:	8^{th} Semester.
2.3 Credits	:	3
2.4 Hours	:	2 HT; 2 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	:	AR400. Scientific Research Methodology. (7^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Statistics and Research Instruments is the second course of the research track, taking the research-design foundation from Scientific Research Methodology (ARC400) and adding the quantitative-analysis and instrument-design toolkit – descriptive statistics, estimation, hypothesis testing, simple regression – that Research Workshop (ARC402) will assume students can apply unsupervised to their own thesis data.

5. GOALS

- Summarize territorial/urban datasets using numerical measures of location, spread, and shape.
- Estimate population parameters from sample data (point and interval estimation) and interpret confidence intervals in a territorial context.
- Formulate and test statistical hypotheses about urban phenomena, interpreting significance correctly.
- Fit and interpret a simple linear regression model relating two urban variables.
- Design and validate data-collection instruments (surveys, structured interviews, observation forms) for a specific research question, including reliability and validity checks.

6. COMPETENCES

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

AG-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Assessment)

7. TOPICS

Unit 1: Numerical Summaries: Location, Spread, and Shape (12 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Measures of location: mean, median, mode, trimmed mean, and weighted mean • Measures of spread: variance, standard deviation, IQR, MAD, and range • Measures of shape: skewness and kurtosis; quantiles and percentiles • Robust summary statistics: resistance to outliers and heavy-tailed distributions	• Calculate and interpret measures of location, spread, and shape for a univariate dataset [Usage] • Select appropriate summary statistics based on the distributional properties of the data [Usage] • Compare classical and robust summary statistics and justify the choice for a given dataset [Assessment]
Readings : [MMC17]	

Unit 2: Point Estimation (10 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Desirable properties: unbiasedness, consistency, efficiency, and sufficiency • Method of moments estimation: derivation and asymptotic properties • Maximum likelihood estimation: derivation, properties, and invariance principle • Cramer-Rao lower bound and the concept of Fisher information	• Describe the key properties of estimators and explain the trade-offs between them [Familiarity] • Derive method of moments and MLE estimators for standard distributions [Usage] • Evaluate the efficiency of an estimator using the Cramer-Rao lower bound [Assessment]
Readings : [MMC17]	

Unit 3: Interval Estimation and Confidence Intervals (10 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Constructing confidence intervals using pivotal quantities and exact distributions • Correct interpretation of confidence intervals: coverage probability and common misconceptions • Large-sample confidence intervals based on asymptotic normality • Duality between confidence intervals and hypothesis tests	• Construct confidence intervals for means, proportions, and variances using exact and large-sample methods [Usage] • Interpret confidence intervals correctly and identify common misinterpretations [Usage] • Explain the duality between confidence intervals and hypothesis tests and use it to draw inferences [Assessment]
Readings : [MMC17]	

Unit 4: Hypothesis Testing Foundations (10 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Neyman-Pearson framework: null/alternative hypotheses, rejection regions, Type I and II errors • p-values: definition, correct interpretation, and common misuse; power and sample size • Common parametric tests: z-test, t-test, F-test, chi-squared test • Neyman-Pearson lemma and uniformly most powerful tests	• Explain the logic of hypothesis testing, Type I and II errors, and the meaning of a p-value [Familiarity] • Apply standard parametric tests and interpret the results in context [Usage] • Derive the most powerful test for a simple hypothesis using the Neyman-Pearson lemma [Assessment]
Readings : [MMC17]	

Unit 5: Simple Linear Regression (10 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Ordinary least squares estimation: derivation of coefficients and their properties • Inference for regression coefficients: t-tests, confidence intervals, and p-values • Coefficient of determination R-squared and analysis of variance decomposition • Gauss-Markov theorem: BLUE property of OLS under classical assumptions	• Fit a simple linear regression model and interpret the estimated coefficients [Usage] • Conduct hypothesis tests and construct confidence intervals for regression parameters [Usage] • Verify the Gauss-Markov assumptions and assess their consequences when violated [Assessment]
Readings : [MMC17]	

Unit 6: Research Hypotheses and Variables (12 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Types of hypotheses: null, alternative, directional, and non-directional, and their relationship to research questions • Classification of variables: independent, dependent, control, and confounding • Operationalizing variables: defining measurable indicators and measurement scales (nominal, ordinal, interval, ratio) • Relationship between hypotheses, variables, and statistical significance tests: significance level, Type I and Type II error • Graphical representation of the relationship between variables through conceptual or operational models	• Distinguish between null and alternative hypotheses, and between independent, dependent, and control variables, in a civil engineering research problem [Familiarity] • Formulate a testable research hypothesis and operationalize its variables for a specific problem in the chosen specialization area [Usage] • Evaluate the consistency between the theoretical framework, the stated hypothesis, and the proposed data-collection design [Assessment]
Readings : [Sal17]	

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

[MMC17] David S. Moore, George P. McCabe, and Bruce A. Craig. *Introduction to the Practice of Statistics*. 9th. W. H. Freeman, 2017.

[Sal17] Neil J. Salkind. *Statistics for People Who (Think They) Hate Statistics*. 6th. SAGE Publications, 2017.

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

1. COURSE

AR3B4. Heritage and Infrastructure (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3B4. Heritage and Infrastructure
2.2 Semester	:	9^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3B3. Facilities Management. (8^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Heritage and Infrastructure is the ninth course of the ten-course BIM I-X sequence, building on the authoring, coordination, scheduling, cost, sustainability, and facilities-management workflows developed through Facilities Management (AR3B3, prerequisite). It takes BIM methods beyond the conventional new-build vertical building: Heritage BIM (HBIM) for documenting and monitoring historic fabric, BIM's extension to horizontal/civil infrastructure and city-scale urban information modeling, and reality-capture techniques (laser scanning, photogrammetry) that ground any of these models in verified real-world geometry. Together with the recurring BIM Software Practicum, it equips students with the specialized BIM skill set needed for heritage conservation, infrastructure, and as-built documentation practice, immediately ahead of the sequence's integrative capstone course, AI-Assisted Automation.

5. GOALS

- Author a Heritage BIM (HBIM) model of a historic building element from laser-scan data, enriching it with semantic conservation data (material, decay condition, past interventions).
- Extend BIM authoring beyond the single building to horizontal infrastructure and city-scale urban information models, integrating building-scale BIM with city-scale GIS data.
- Capture real-world geometry through laser scanning and photogrammetry and use the resulting point clouds or meshes as a modeling and as-built verification reference inside a BIM authoring tool.
- Complete a sequence of guided, certification-aligned software exercises building toward a cumulative BIM practicum deliverable.

6. COMPETENCES

AG-A01) Evaluates the impact of architectural solutions on sustainable development, economy, health and safety, the legal framework, architectural-urban heritage, and the environment. (Usage)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Usage)

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

7. TOPICS

Unit 1: Heritage BIM (HBIM) (24 hours)	
Competences Expected: AG-A01	
Topics	**Learning Outcomes**
• Heritage BIM (HBIM): object-oriented modeling of historic buildings using non-parametric (discrete) and parametric libraries • Scan-to-BIM workflow: processing point clouds from laser scanning to create 3D models with semantic decomposition (walls, vaults, windows) • Semantic enrichment for heritage: adding conservation data (material type, decay grade, past interventions, monitoring history) to BIM objects • Digital twins for heritage: integrating real-time monitoring sensors (cracks, displacement, humidity, temperature) with HBIM • HBIM standards and guidelines: ICOMOS HBIM Guidelines, CIDOC CRM for cultural heritage data, and the integration of HBIM with conservation management plan data fields	• Describe the concept of Heritage BIM (HBIM) and explain how it differs from conventional BIM in terms of geometry representation and semantic data [Familiarity] • Create an HBIM model of a historic building element (vault, window, wall) from laser scan data, enriching it with semantic data (material, decay condition, past interventions) [Usage] • Evaluate a proposed HBIM workplan for a heritage project, assessing the level of detail required for documentation and the compatibility of data schema with monitoring needs [Assessment]
Readings : [MMP09]	

Unit 2: BIM for Infrastructure and Urban Modeling (24 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• BIM for horizontal/civil infrastructure: roads, bridges, and utility networks modeled with alignment-based and corridor-modeling tools (Civil 3D, InfraWorks), distinct from vertical-building BIM authoring • City Information Modeling (CIM) and urban digital twins: integrating building-scale BIM with city-scale GIS data (CityGML, 3D Tiles) for planning and infrastructure coordination	• Describe how BIM methods extend to horizontal infrastructure and city-scale modeling, and identify the tools and data standards specific to each scale [Familiarity] • Model a piece of infrastructure (road segment, utility corridor) using alignment-based BIM tools, and integrate it with an urban-scale GIS dataset [Usage] • Evaluate an infrastructure or city-information model for data interoperability between building-scale BIM and city-scale GIS systems [Assessment]
Readings : [Cos+18]	

Unit 3: Reality Capture for BIM: Point Clouds and Photogrammetry (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Laser scanning workflows: terrestrial and handheld scanner data capture, registration of multiple scans, and point-cloud cleanup • Photogrammetric reconstruction: structure-from-motion processing of overlapping photographs (drone or handheld) into dense point clouds and textured meshes • Working from point-cloud or mesh references inside a BIM authoring tool: underlay referencing, scan-based dimension checking, and as-built verification against design models	• Describe how laser scanning and photogrammetry capture real-world geometry as point-cloud or mesh data usable inside a BIM authoring tool [Familiarity] • Register a set of scans or photographs into a point cloud, and use it as a reference to verify or model an as-built condition in BIM [Usage] • Evaluate a reality-capture data set for registration accuracy and its adequacy as a reference for as-built BIM modeling [Assessment]
Readings : [Luh+19]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [Wey11]	

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

[MMP09] Maurice Murphy, Eugene McGovern, and Sara Pavia. "Historic building information modelling (HBIM)". In: *Structural Survey* 27.4 (2009), pp. 311–327.

[Wey11] Robert S. Weygant. *BIM Content Development: Standards, Strategies, and Best Practices*. 1st. Wiley, 2011.

[Cos+18] Aaron Costin et al. "Building Information Modeling (BIM) for transportation infrastructure – Literature review, applications, challenges, and recommendations". In: *Automation in Construction* 94 (2018), pp. 257–281.

[Luh+19] Thomas Luhmann et al. *Close-Range Photogrammetry and 3D Imaging*. 3rd. De Gruyter, 2019.

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

1. COURSE

AR3D3. Design Studio IX (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3D3. Design Studio IX
2.2 Semester	:	9^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3D2. Design Studio VIII. (8^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio IX: Metropolitan Infrastructure and Civic Facility raises the sequence's scale and program complexity once more after Design Studio VIII (AR3D2, prerequisite), to the metropolitan scale: students design a high-complexity civic facility – a transit terminal, a stadium, a convention center – whose scale requires long-span structural systems and an explicit integration with the city's urban structure, alongside the development feasibility analysis appropriate to a project of this magnitude. This course is the foundation for the sequence's final, most comprehensive studio, Design Studio X (AR3D4).

5. GOALS

- Design the programming and spatial organization of a high-complexity civic facility at metropolitan scale.
- Design long-span structural systems (trusses, space frames, shells, or tensile structures) appropriate to a large-scale civic facility.
- Integrate the civic facility's design with the city's structure across scales – from the regional network down to its immediate urban context.
- Coordinate the structural, envelope, and building-system assemblies required by a large-scale, high-complexity building.
- Evaluate the development feasibility of a metropolitan-scale civic facility, including market, regulatory, and financial constraints.

6. COMPETENCES

AG-A08) Understands the structural and environmental design problems associated with construction and the engineering of building design. (Usage)

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

7. TOPICS

Unit 1: Large-Scale and Complex Buildings (14 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Programming and spatial organization at large scale: stacking diagrams, core-to-perimeter ratios, vertical circulation strategies, • Life safety and means of egress in large buildings: occupancy-based egress design, pressurized stairwells, refuge floors, fire compartmentalization, and NFPA/IBC requirements • Vertical transportation systems: elevator group design, sky lobbies, express/local zone strategies, escalators, and integration of vertical transport into building form • Hybrid and mixed-use building design: separating and linking residential, commercial, hotel, and civic programs; transfer floors, podium strategies, and shared amenity programming • Phased construction and building complexity: designing for construction staging, operational continuity, future expansion, and changeable use within long-lifespan complex buildings • Campus and master plan design at large scale: site organization, wayfinding, public realm, phasing, infrastructure coordination, and identity across a multi-building ensemble	• Identify the key design challenges - program complexity, life safety, vertical transport, and phasing - that distinguish large-scale buildings from smaller architectural projects [Familiarity] • Apply large-scale building design strategies to develop a spatial and programmatic organization for a complex multi-story or mixed-use building typology [Usage] • Evaluate a large-scale building design for programmatic coherence, life safety compliance, and operational efficiency [Assessment]
Readings : [**Schierle2012**]	

Unit 2: Urban Design at Multiple Scales (10 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Regional and city scale: transit corridors, green belts, growth boundaries, satellite towns, and the relationship between density • Neighborhood scale: walkability (5-10 minute walking radius), mixed-use zoning, social infrastructure (schools, clinics, community centers), and the 20-minute neighborhood concept • Block and street scale: block length for pedestrian permeability (80-120 m max), street section design (lane widths, sidewalks, bike lanes, street trees, furniture zone), • Public space design: squares, plazas, parks, pocket parks, and streets as public space; William Whyte's elements of successful public space (sittable space, sun, food • Urban design guidelines: building setbacks, height limits, architectural character, facade articulation, signage, lighting,	• Describe the key design considerations at each urban scale - regional, neighborhood, block, street, and public space - [Familiarity] • Develop a set of urban design guidelines for a specific neighborhood or street typology, integrating density, building height, block length, street section, [Usage] • Evaluate an urban design project for its multi-scale coherence, assessing how well it integrates regional transit, neighborhood walkability, block permeability, street safety, [Assessment]
Readings : [**Lynch1960**]	

Unit 3: Long-Span and Special Structures (12 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Arches and vaults: funicular compression geometry, buttressing requirements, ribbed vs. continuous vaults, and historic and contemporary applications (Guastavino, Candela) • Domes and shells: membrane theory, edge ring forces, buckling in thin shells, geodesic domes (Fuller), and reinforced concrete shells (Nervi, Isler) • Space frames and long-span trusses: three-dimensional truss action, node design, modular systems (Mero, Unistrut), and application in arenas, airports, and exhibition halls • Tensile and cable structures: cable nets (Frei Otto), fabric membranes (PTFE-coated fiberglass, ETFE), masts and anchorage design, and form-finding via physical • Folded plate structures: corrugated geometry for stiffness, folded plate concrete roofs, and timber folded plate systems (CLT folded plates) • Deployable and transformable structures: scissor linkages, pantographic systems, and their application in retractable roofs, emergency shelters, and kinetic architecture	• Describe the principal long-span structural systems - arches, domes, space frames, tensile membranes - and identify the appropriate span range [Familiarity] • Select and conceptualize a long-span structural system for a given program (e.g., stadium, airport terminal, convention center), justifying the choice by span, load, [Usage] • Evaluate the structural efficiency and architectural expression of a built long-span structure, analyzing its load path, stability, and integration of form with structural logic [Assessment]
Readings : [**Schierle2012**]	

Unit 4: Building Systems and Assemblies (10 hours)	
Competences Expected: AG-A08	
Topics	**Learning Outcomes**
• Integration of building systems: coordinating structural frame, mechanical/electrical/plumbing (MEP), envelope, and interior fit-out within constrained floor-to-floor heights • Construction documentation for assemblies: details at 1:5, 1:10, and 1:20; section-through-wall details, sill and head conditions, and coordination between architectural • Construction tolerances and coordination: dimensional tolerances in concrete, steel, and masonry; clearances for MEP rough-in • Waterproofing and moisture management: below-grade waterproofing systems, drainage planes, vapor barriers, and flashing at penetrations • Fire-rated assemblies: UL-listed wall, floor, and ceiling assemblies; fire-stopping at penetrations, intumescent seals, and the architectural detailing required by fire codes • Prefabricated and modular assemblies: volumetric modular construction, panelized wall systems, and the design implications of off-site manufacturing tolerances	• Identify the principal building systems and describe how they are integrated and coordinated within a multi-story building assembly [Familiarity] • Develop construction-level details for a building assembly that correctly coordinate structural, envelope, and MEP systems within realistic tolerances and code requirements [Usage] • Evaluate a set of construction documents for assembly coordination quality, identifying conflicts, missing details, and buildability risks [Assessment]
Readings : [**AllenIano2019**]	

Unit 5: Development Process and Feasibility (8 hours)	
Competences Expected: AG-A12	
Topics	**Learning Outcomes**
• Development phases: site identification, option agreement, due diligence, entitlement (zoning, permits), design • Due diligence for development sites: title review, environmental assessment (Phase I and II), geotechnical investigation, zoning analysis, utility availability, • Entitlements and permitting: land use approvals (rezoning, variances, conditional use permits), building permits, impact fees (school, traffic, parks) • Feasibility study components: market support, site suitability, regulatory pathway, construction feasibility, financial pro forma (with sensitivity analysis), • Real estate pro forma basics: projected net operating income (NOI = gross potential rent minus vacancy allowance minus operating expenses), debt service coverage ratio (DSCR),	• Describe the major stages of the real estate development process - predevelopment, construction, lease-up, disposition - and the due diligence [Familiarity] • Prepare a feasibility study for a proposed development, including market analysis, site due diligence summary, entitlement pathway, construction cost estimate, [Usage] • Evaluate a development pro forma for financial viability, identifying understated risk (vacancy, construction contingency) [Assessment]
Readings : [**MilesBerensWeiss2007**]	

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

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

1. COURSE

AR402. Research Workshop (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR402. Research Workshop
2.2 Semester	:	9^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 HT;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	AR401. Statistics and Research Instruments. (8^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Research Workshop is the applied, tutored counterpart of Scientific Research Methodology (ARC400) and Statistics (ARC401): instead of learning methods in the abstract, each student designs their own non-experimental research proposal on a real territorial problem, culminating in a consistency matrix. This mirrors the existing Thesis I course (AR401), reusing the same three Research KUs (Design, Theoretical Framework, Hypotheses and Variables) without the design-studio-specific unit, since this track's output is a research proposal, not a design project.

5. GOALS

- Formulate hypotheses and operationalize the variables of a territorial or urban research problem chosen by the student.
- Select and justify a research design appropriate to the student's own thesis topic, applying the methods learned in ARC400.
- Build the theoretical framework and state of the art of the student's own research proposal.
- Produce a complete, internally consistent research proposal (consistency matrix) ready to be executed in Research Work (ARC403).

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-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Assessment)

7. TOPICS

Unit 1: Research Design and Methodologies (20 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Formulating research questions in architecture: descriptive, relational, causal; turning design problems into researchable questions • Choosing a research methodology: quantitative (hypothesis testing, statistical), qualitative (interpretive, case study), mixed methods, • Validity and reliability in architectural research: internal validity, external validity (generalizability), construct validity, • Research ethics in architectural research: informed consent, privacy (anonymization of building users), institutional review board (IRB) protocols, • Mixed methods research: sequential (qualitative then quantitative) and concurrent designs; integrating qualitative findings (user interviews) with quantitative data (occupancy	• Describe the main research methodologies in architecture - quantitative, qualitative, mixed methods, practice-based - and explain their appropriate applications [Familiarity] • Develop a research design for an architectural inquiry, including research question, literature review, methodology selection, data collection protocol, and analysis plan [Usage] • Evaluate the research design of a published architectural study for validity, reliability, and ethical soundness, identifying methodological strengths and weaknesses [Assessment]
Readings : [CC18], [GW13]	

Unit 2: Theoretical Framework and Literature Review (20 hours)	
Competences Expected: AG-A04	
Topics	**Learning Outcomes**
• Systematic search of scientific and technical literature: specialized databases (Scopus, Web of Science, ASCE Library), keywords, and Boolean operators • Critical reading and synthesis of scientific articles, technical standards, and prior research reports • Building the conceptual and theoretical framework: defining key concepts, relationships between variables, and reference theoretical models • Identifying knowledge gaps (research gap) and justifying the originality of the proposed contribution • Bibliographic reference management and citation styles (APA, IEEE) using tools such as Zotero or Mendeley	• Explain the structure and purpose of a theoretical framework within a civil engineering research project [Familiarity] • Conduct a systematic search of scientific and technical literature on a chosen research topic using specialized databases [Usage] • Synthesize the state of the art of a research topic into a coherent theoretical framework that identifies a knowledge gap [Assessment]
Readings : [CC18], [GW13]	

Unit 3: Research Hypotheses and Variables (16 hours)	
Competences Expected: AG-A10	
Topics	**Learning Outcomes**
• Types of hypotheses: null, alternative, directional, and non-directional, and their relationship to research questions • Classification of variables: independent, dependent, control, and confounding • Operationalizing variables: defining measurable indicators and measurement scales (nominal, ordinal, interval, ratio) • Relationship between hypotheses, variables, and statistical significance tests: significance level, Type I and Type II error • Graphical representation of the relationship between variables through conceptual or operational models	• Distinguish between null and alternative hypotheses, and between independent, dependent, and control variables, in a civil engineering research problem [Familiarity] • Formulate a testable research hypothesis and operationalize its variables for a specific problem in the chosen specialization area [Usage] • Evaluate the consistency between the theoretical framework, the stated hypothesis, and the proposed data-collection design [Assessment]
Readings : [CC18], [Sal17]	

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.

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9. EVALUATION SYSTEM

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

10. BASIC BIBLIOGRAPHY

[GW13] Linda N. Groat and David Wang. *Architectural Research Methods*. 2nd. Wiley, 2013.

[Sal17] Neil J. Salkind. *Statistics for People Who (Think They) Hate Statistics*. 6th. SAGE Publications, 2017.

[CC18] John W. Creswell and J. David Creswell. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th. SAGE Publications, 2018.

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

1. COURSE

AR3D4. Design Studio X (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR3D4. Design Studio X
2.2 Semester	:	10^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3D3. Design Studio IX. (9^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio X: Comprehensive Architectural Project closes the Design Studio sequence that began in Design Studio I (AR1D1) and continued through Design Studio IX (AR3D3, prerequisite). Students develop a high-complexity anteproyecto (preliminary design) that integrates, for the first time within a single project, every major dimension practiced across the sequence: a complex building program, a fully coordinated structural and systems assembly, net-zero-oriented sustainability strategies, and Building Information Modeling as the representational and coordination platform, all verified against applicable building codes. Unlike the Tesis sequence (AR401-AR403), this course does not involve thesis research or an individual defense: it is the Design Studio sequence's comprehensive, integrative capstone project.

5. GOALS

- Develop a comprehensive architectural anteproyecto that integrates complex programming, structural logic, and building systems into a single coherent design proposal.
- Coordinate the structural, envelope, and building-system assemblies of the comprehensive project into a constructible whole.
- Apply net-zero and high-performance sustainability strategies (energy modeling, efficiency-first design, on-site renewables) to the comprehensive project.
- Develop and coordinate the comprehensive project using Building Information Modeling, from conceptual massing to a construction- ready level of development.
- Verify the comprehensive project's compliance with applicable building codes and regulations.

6. COMPETENCES

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

AG-A13) Demonstrates knowledge of the means to achieve ecologically responsible design and environmental conservation and rehabilitation. (Usage)

7. TOPICS

Unit 1: Large-Scale and Complex Buildings (16 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Programming and spatial organization at large scale: stacking diagrams, core-to-perimeter ratios, vertical circulation strategies, • Life safety and means of egress in large buildings: occupancy-based egress design, pressurized stairwells, refuge floors, fire compartmentalization, and NFPA/IBC requirements • Vertical transportation systems: elevator group design, sky lobbies, express/local zone strategies, escalators, and integration of vertical transport into building form • Hybrid and mixed-use building design: separating and linking residential, commercial, hotel, and civic programs; transfer floors, podium strategies, and shared amenity programming • Phased construction and building complexity: designing for construction staging, operational continuity, future expansion, and changeable use within long-lifespan complex buildings • Campus and master plan design at large scale: site organization, wayfinding, public realm, phasing, infrastructure coordination, and identity across a multi-building ensemble	• Identify the key design challenges - program complexity, life safety, vertical transport, and phasing - that distinguish large-scale buildings from smaller architectural projects [Familiarity] • Apply large-scale building design strategies to develop a spatial and programmatic organization for a complex multi-story or mixed-use building typology [Usage] • Evaluate a large-scale building design for programmatic coherence, life safety compliance, and operational efficiency [Assessment]
Readings : [**Schierle2012**]	

Unit 2: Building Systems and Assemblies (12 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Integration of building systems: coordinating structural frame, mechanical/electrical/plumbing (MEP), envelope, and interior fit-out within constrained floor-to-floor heights • Construction documentation for assemblies: details at 1:5, 1:10, and 1:20; section-through-wall details, sill and head conditions, and coordination between architectural • Construction tolerances and coordination: dimensional tolerances in concrete, steel, and masonry; clearances for MEP rough-in • Waterproofing and moisture management: below-grade waterproofing systems, drainage planes, vapor barriers, and flashing at penetrations • Fire-rated assemblies: UL-listed wall, floor, and ceiling assemblies; fire-stopping at penetrations, intumescent seals, and the architectural detailing required by fire codes • Prefabricated and modular assemblies: volumetric modular construction, panelized wall systems, and the design implications of off-site manufacturing tolerances	• Identify the principal building systems and describe how they are integrated and coordinated within a multi-story building assembly [Familiarity] • Develop construction-level details for a building assembly that correctly coordinate structural, envelope, and MEP systems within realistic tolerances and code requirements [Usage] • Evaluate a set of construction documents for assembly coordination quality, identifying conflicts, missing details, and buildability risks [Assessment]
Readings : [**AllenIano2019**]	

Unit 3: BIM Fundamentals and Authoring (5 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• Core BIM concepts: object-oriented modeling (walls, doors, windows with embedded data), parametric relationships (hosting, constraints), and the difference between BIM and conventional 2D/3D modeling • BIM authoring tools: Revit (project-based, family editor), ArchiCAD (virtual building model), Vectorworks, and their respective modeling philosophies and interoperability • Level of development (LOD) specification: LOD 100 (conceptual), 200 (schematic), 300 (detailed), 350 (construction-ready), 400 (fabrication), 500 (as-built) • Data exchange standards: Industry Foundation Classes (IFC) as openBIM exchange format, IFC schema (IfcWall, IfcDoor, IfcWindow, IfcSpace), and vendor-neutral model interoperability	• Describe the core concepts of BIM: object-based modeling, parametric relationships, LOD, and data exchange via IFC, and explain how BIM differs from traditional 2D CAD [Familiarity] • Develop a BIM model of a small building at LOD 200-300, producing plans, sections, elevations, and a simple schedule directly from the model, and export the model to IFC format [Usage] • Evaluate a BIM model for appropriate LOD, correct parametric relationships, and clean IFC export, identifying modeling errors that would impede downstream coordination or data exchange [Assessment]
Readings : [**Eastman2011**]	

Unit 4: BIM Execution Planning and Standards (3 hours)	
Competences Expected: AG-A09	
Topics	**Learning Outcomes**
• BIM Execution Plan (BEP): project goals for BIM use (clash detection, 4D/5D, facility management), LOD matrix by discipline, model sharing protocols • ISO 19650 framework: information management using BIM across the delivery and operational phases of assets, information requirements (EIR, OIR, AIR), and the information-delivery cycle	• Describe the purpose of a BIM Execution Plan and the ISO 19650 information-management framework, and explain how they structure a project's BIM deliverables [Familiarity] • Draft a BIM Execution Plan for a project, specifying BIM goals, LOD matrix, and information-delivery milestones aligned with ISO 19650 [Usage] • Evaluate a BIM Execution Plan for a design project, assessing its LOD specifications, exchange protocols, and BIM use cases for adequacy and clarity [Assessment]
Readings : [**Eastman2011**]	

Unit 5: Energy Efficiency and Net-Zero Design (10 hours)	
Competences Expected: AG-A13	
Topics	**Learning Outcomes**
• Building energy modeling (BEM): physics-based simulation (EnergyPlus, eQUEST, IES VE), input parameters (envelope, lighting, HVAC, schedules, plug loads), • Efficiency-first approach: envelope optimization (high R-value, low air leakage), high-performance glazing, efficient lighting (LED with controls), • On-site renewable energy: photovoltaic (PV) array sizing (roof, facade, parking canopy), inverter selection, and estimating annual production (PVWatts, SAM) • Zero energy certification frameworks: NZEB (zero net energy building) definitions by DOE, Living Building Challenge Energy Petal, and Passive House Plus • Deep energy retrofit for existing buildings: envelope upgrades (window replacement, exterior insulation), HVAC replacement with heat pumps, and lighting retrofit	• Describe the components of a net-zero energy building design - load reduction, efficiency, and on-site renewables - [Familiarity] • Perform a preliminary energy balance for a building design, calculating estimated EUI from a simple model and sizing a PV array to offset annual energy consumption [Usage] • Evaluate a proposed net-zero building design by reviewing its energy model inputs and assumptions, identifying unrealistic plug load estimates or insufficient PV area, [Assessment]
Readings : [**Kibert2016**]	

Unit 6: Building Codes, Accessibility, and Zoning (8 hours)	
Competences Expected: AG-A12	
Topics	**Learning Outcomes**
• Building codes and standards: IBC (International Building Code), IRC (International Residential Code), IFC (International Fire Code) • Means-of-egress and fire-evacuation route design: maximum travel distance to an exit, number and width of exits required by occupant load, exit discharge and assembly points, and diagramming evacuation routes on a life-safety plan • Accessibility codes: ADA Standards for Accessible Design, ICC A117.1, and local accessible building codes • Energy codes: IECC (International Energy Conservation Code), ASHRAE 90.1; prescriptive vs. performance paths • Zoning and land use regulations: zoning districts (residential, commercial, industrial, mixed-use), floor area ratio (FAR), lot coverage, setbacks, height limits • Permitting process: building permit, variance, special exception; code interpretation appeals; the architect's role in preparing permit sets, responding to plan review comments	• Describe the key provisions of building codes that affect architectural design - occupancy classification, means of egress, fire-resistance, accessibility, and energy performance [Familiarity] • Apply IBC occupancy and construction type tables to determine allowable building area and height for a given use and sprinkler status, [Usage] • Evaluate a building design's code compliance for accessibility (ADA) and life safety (IBC), identifying violations and recommending code-conforming modifications [Assessment]
Readings : [**ChingCodes2017**]	

8. WORKPLAN

8.1 Methodology

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8.2 Theory Sessions

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

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

1. COURSE

AR403. Research Work (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR403. Research Work
2.2 Semester	:	10^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 HT;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerrequisites	:	AR402. Research Workshop. (9^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Research Work is the execution and defense phase of the research track, building directly on the approved proposal from Research Workshop (ARC402, prerequisite). Each student works under individualized advisor supervision to collect, process, and analyze data on a real territorial or urban problem, arriving at evidence-grounded conclusions that respond to the research questions formulated earlier in the sequence.

5. GOALS

- That the student executes the research proposal approved in Research Workshop (ARC402), collecting and analyzing data on a real territorial problem.
- That the student arrives at evidence-based conclusions and formulates actionable recommendations for the territorial problem studied.
- The deliverables of this course are:

  Partial: Data collection, processing, and preliminary analysis against the approved consistency matrix.

  Final: A complete research report (data analysis, discussion of results, conclusions, and recommendations), defended before an academic and professional jury.

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-A10) Conducts studies of complex problems using research methods, experimental design, data analysis, and information synthesis to reach valid conclusions. (Assessment)

7. TOPICS

Unit 1: Data Collection, Analysis, and Discussion of Results (48 hours)	
Competences Expected: AG-A04,AG-A10	
Topics	**Learning Outcomes**
• Fieldwork and data collection according to the approved instruments (surveys, interviews, GIS/territorial data). • Data processing, analysis, and triangulation (methodological, data, or investigator triangulation). • Discussion of results against the theoretical framework and comparison with relevant prior studies.	• Collect and process data according to the methods and instruments approved in the research proposal [Usar]. • Analyze the collected data and discuss the results against the theoretical framework and prior literature [Evaluar]. • Formulate evidence-grounded conclusions and actionable recommendations for the territorial problem studied [Evaluar].
Readings : [Boo+16], [Yin18]	

Unit 2: Research Report and Defense (32 hours)	
Competences Expected: AG-A04,AG-A10	
Topics	**Learning Outcomes**
• Structure and academic writing conventions of a research report (introduction, methods, results, discussion, conclusions). • Preparation and delivery of an oral defense before an academic and professional jury.	• Write a complete research report following academic conventions, integrating conclusions and recommendations [Evaluar]. • Defend the research work before an academic and professional jury, responding to questions about methodology and findings [Evaluar].
Readings : [Boo+16]	

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

[Boo+16] Wayne C. Booth et al. *The Craft of Research*. 4th. University of Chicago Press, 2016.

[Yin18] Robert K. Yin. *Case Study Research and Applications: Design and Methods*. 6th. SAGE Publications, 2018.

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

1. COURSE

AR404. Innovation and Entrepreneurship (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR404. Innovation and Entrepreneurship
2.2 Semester	:	10^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 HT;
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

Innovation and Entrepreneurship closes the specialization alongside Research Work (ARC403), giving students the professional-practice and real-estate-development toolkit – entrepreneurship models, project feasibility, PropTech, and participatory development – needed to turn a territorial or urban diagnosis into a viable, fundable initiative. It draws on Real Estate Development and Construction Economics (RED) and the entrepreneurship-specific unit of Professional Practice and Ethics (PRO), the two Arch2027 knowledge areas that cover the business side of the profession.

5. GOALS

- Identify the professional and business dimension of practicing architecture and urbanism, including entrepreneurship models and firm structures.
- Assess the technical and financial feasibility of a territorial development initiative (market analysis, cost, financing).
- Evaluate digital/PropTech innovations applicable to real-estate and territorial-development processes.
- Design a participatory, stakeholder-engaged process for a territorial or urban innovation initiative.

6. COMPETENCES

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Assessment)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Assessment)

7. TOPICS

Unit 1: Business of Architecture and Entrepreneurship (16 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Architectural firm management: business structures (sole proprietorship, LLC, corporation), financial management (overhead, billable rates, utilization rate, profit margin), • Fee structures and negotiation: hourly, percentage of construction cost, lump sum, and design-build fees; calculating multiplier and break-even rate • Business development and marketing: identifying target project types, proposal writing, interview preparation, client relationship management (CRM), • Entrepreneurial architecture: product-based practice (design-build of prefab units, furniture, components), architect as developer, start-up models (coworking, remote practice) • Intellectual property in architecture: copyright ownership of architectural works (US Copyright Act, Berne Convention), licensing of drawings and digital models, moral rights,	• Identify the key financial metrics of architectural practice (utilization rate, multiplier, break-even rate) and describe common fee structures and their risks and benefits [Familiarity] • Prepare a simple business plan for a hypothetical architectural firm, including target markets, fee strategy, staffing plan, and financial projections for the first three years [Usage] • Evaluate a firm's financial performance using P&L statements, balance sheets, and KPI benchmarks from AIA or RIBA business surveys [Assessment]
Readings : [OP10]	

Unit 2: Development Process and Feasibility (16 hours)	
Competences Expected: AG-A05	
Topics	**Learning Outcomes**
• Development phases: site identification, option agreement, due diligence, entitlement (zoning, permits), design • Due diligence for development sites: title review, environmental assessment (Phase I and II), geotechnical investigation, zoning analysis, utility availability, • Entitlements and permitting: land use approvals (rezoning, variances, conditional use permits), building permits, impact fees (school, traffic, parks) • Feasibility study components: market support, site suitability, regulatory pathway, construction feasibility, financial pro forma (with sensitivity analysis), • Real estate pro forma basics: projected net operating income (NOI = gross potential rent minus vacancy allowance minus operating expenses), debt service coverage ratio (DSCR),	• Describe the major stages of the real estate development process - predevelopment, construction, lease-up, disposition - and the due diligence [Familiarity] • Prepare a feasibility study for a proposed development, including market analysis, site due diligence summary, entitlement pathway, construction cost estimate, [Usage] • Evaluate a development pro forma for financial viability, identifying understated risk (vacancy, construction contingency) [Assessment]
Readings : [PH19]	

Unit 3: PropTech and Digital Real Estate Innovation (16 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• PropTech categories: marketing and leasing (listing platforms, CRM), asset and property management (tenant portals, maintenance platforms), data • AI in real estate: automated valuation models (AVM), rent prediction models, tenant behavior analytics, and AI for site selection (site scoring, foot traffic analysis) • Blockchain in real estate: tokenization of real estate assets (fractional ownership), smart contracts for lease • Smart building data for real estate: IoT sensor data (occupancy, energy, indoor environmental quality) used for performance-based leasing, predictive maintenance, • Commercial real estate tech (CREtech): online leasing platforms (VTS, Reonomy), virtual tours and 3D scanning, flex-space management software,	• Describe the main categories of PropTech (marketing, management, analytics, investment, construction) and how they affect real estate development and operations [Familiarity] • Propose a PropTech solution to a real estate development or management problem (e.g., lease-up velocity, tenant retention, valuation accuracy), specifying the data sources [Usage] • Evaluate a PropTech startup or platform for its value to developers or investors, assessing its data accuracy, integration capabilities, regulatory compliance, [Assessment]
Readings : [SB20]	

Unit 4: Stakeholder and Participatory Development (16 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Levels of stakeholder participation in development: inform, consult, involve, collaborate, empower (Arnstein's ladder) • Community benefits agreements (CBA): negotiating community benefits (local hiring, affordable housing, public space) in exchange for development approval, legal enforceability • Stakeholder mapping and analysis: identifying interest, influence, and impact on the development; designing engagement strategies for supportive, neutral, • Inclusive development models: land trusts, cooperative housing, community land banks, and public-community partnerships that give residents a stake in development outcomes • Participatory budgeting in development: allocating a portion of public infrastructure budget through community vote	• Describe the levels of stakeholder participation in development and the mechanisms (CBA, participatory budgeting, land trust) for inclusive development [Familiarity] • Develop a community engagement plan for a real estate development project, identifying stakeholders, choosing participation methods, [Usage] • Evaluate a community benefits agreement or participatory process for representativeness, enforceability, and impact on equitable development outcomes [Assessment]
Readings : [Bro09]	

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

[Bro09] Tim Brown. *Change by Design*. 1st. Harper Business, 2009.

[OP10] Alexander Osterwalder and Yves Pigneur. *Business Model Generation*. 1st. Wiley, 2010.

[PH19] Richard B. Peiser and David Hamilton. *Professional Real Estate Development: The ULI Guide to the Business*. 4th. Urban Land Institute, 2019.

[SB20] Andrew Saull and Alex Bayer. *The PropTech Guide*. 1st. self-published / Future PropTech, 2020.

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School of Architecture
Syllabus 2027-I

1. COURSE

AR4B1. AI-Assisted Automation (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR4B1. AI-Assisted Automation
2.2 Semester	:	10^{th} Semester.
2.3 Credits	:	4
2.4 Hours	:	4 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	:	AR3B4. Heritage and Infrastructure. (9^{th} Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

AI-Assisted Automation closes the ten-course required BIM I-X sequence (AR1B1 through AR4B1), building directly on the authoring, coordination, scheduling/cost, and facilities-management skills developed course by course across the line, and on Heritage and Infrastructure's (AR3B4) immediate prerequisite content. As the line's capstone, it shifts the focus from any single BIM workflow to the integration of all of them: students apply AI-assisted and scripted automation to real BIM tasks, deliver a single end-to-end project package against their own stated BIM Execution Plan, and critically evaluate the research and practice trends – urban-scale digital twins, blockchain-based model provenance, BIM-robotics convergence – that are extending BIM beyond its current established workflows. The recurring BIM Software Practicum unit closes the course, as it does every course in the line, with a certification-aligned, hands-on deliverable in the tool most relevant to this course's AI-automation focus.

5. GOALS

- Automate repetitive BIM authoring, documentation, and code-compliance tasks using AI-assisted and scripted tools.
- Deliver an end-to-end integrated BIM project package – authoring, coordination, 4D/5D data, and FM handover – against a stated BIM Execution Plan.
- Evaluate emerging BIM research and practice trends (urban-scale digital twins, blockchain model provenance, BIM-robotics convergence) for their near-term professional relevance.
- Complete a certification-aligned software practicum, building a cumulative deliverable that demonstrates proficiency in the course's AI-automation tool focus.

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-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Assessment)

AG-A06) Recognizes the need to learn independently and continuously, adapt to new and emerging technologies, and apply critical thinking in the face of technological change. (Assessment)

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

7. TOPICS

Unit 1: AI-Assisted BIM Automation (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• AI-assisted BIM automation: generative design for structural and MEP routing, automated code compliance checking, NLP-based specification extraction • BIM automation and scripting: automating repetitive tasks (door and window schedules, room data sheets), generative layout for bathrooms and parking • AI-assisted code compliance checking: NLP for parsing building-code provisions, automated rule checking of BIM models against applicable codes	• Describe how AI and scripted automation can generate, check, and optimize BIM content, and identify tasks that are good candidates for automation [Familiarity] • Automate a repetitive BIM task (schedule generation, code-compliance check, or layout generation) using a scripted or AI-assisted tool [Usage] • Evaluate an AI-assisted or scripted BIM automation tool for its accuracy, reliability, and actual time savings over manual methods [Assessment]
Readings : [CM22]	

Unit 2: Integrated BIM Project Delivery (Capstone) (24 hours)	
Competences Expected: AG-A04,AG-A05	
Topics	**Learning Outcomes**
• Integrating a project's full BIM workflow: authoring, federation and clash resolution, 4D/5D linkage, and FM-ready handover data, delivered as a single coherent package • Executing a BIM Execution Plan end to end on a real project deliverable, tracking its stated BIM goals and LOD matrix against what was actually produced	• Describe how a BIM Execution Plan's stated goals connect authoring, coordination, scheduling/cost, and FM handover into a single integrated project workflow [Familiarity] • Deliver an integrated BIM project package covering authoring, coordination, 4D/5D data, and FM handover, following a stated BIM Execution Plan [Usage] • Evaluate an integrated BIM project deliverable against its own BIM Execution Plan, judging completeness and internal consistency across authoring, coordination, and handover data [Assessment]
Readings : [Eas+18]	

Unit 3: Emerging Trends in BIM Practice (24 hours)	
Competences Expected: AG-A06	
Topics	**Learning Outcomes**
• Urban-scale digital twins combining building BIM, infrastructure BIM, and city-scale sensor networks for planning and resilience analysis • Blockchain and distributed-ledger proposals for BIM model provenance, version authenticity, and smart contracts tied to model milestones • Convergence of BIM with construction robotics and autonomous site monitoring, extending the AI-assisted automation already covered in BIM.AIAutomation	• Describe two or three emerging research or practice directions that are extending BIM beyond its current established workflows [Familiarity] • Discuss, with supporting evidence, the practical maturity and adoption barriers of one emerging BIM trend [Usage] • Evaluate the likely near-term impact of an emerging BIM trend on professional practice in the student's own context [Assessment]
Readings : [SRI20]	

Unit 4: BIM Software Practicum (24 hours)	
Competences Expected: AG-A07	
Topics	**Learning Outcomes**
• Guided, graded software exercises in the BIM tool(s) specific to the course's theme (authoring, coordination, scheduling, analysis, or FM platforms), building toward a cumulative course deliverable • Practice aligned with vendor or industry certification exams (Autodesk Certified Professional, buildingSMART openBIM) relevant to the course's software focus	• Describe the practicum structure for the course's BIM software focus and the deliverable it builds toward [Familiarity] • Complete a sequence of guided exercises in the course's BIM software focus, building toward a cumulative practicum deliverable [Usage] • Evaluate the student's own practicum deliverable against the software proficiency expected for the course's BIM theme [Assessment]
Readings : [Dav15]	

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

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9. EVALUATION SYSTEM

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10. BASIC BIBLIOGRAPHY

[Dav15] Scott Davidson. *Grasshopper: Visual Scripting for Rhinoceros 3D*. 1st. self-published / McNeel, 2015.

[Eas+18] Chuck Eastman et al. *BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers*. 3rd. Wiley, 2018.

[SRI20] Anil Sawhney, Mike Riley, and Javier Irizarry, eds. *Construction 4.0: An Innovation Platform for the Built Environment*. 1st. Routledge, 2020.

[CM22] Matias del Campo and Sandra Manninger. *Neural Architecture: Design and Artificial Intelligence*. 1st. ORO Editions, 2022.