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.