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.