Private University of Tacna (UPT)
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

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.

[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.