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	:	4^{th} 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.