

Subject Description Form

Subject Code	ARCH603
Subject Title	Resilient Urban Systems and Smart Metropolitan Planning
Credit Value	3
Level	6
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	This subject prepares students to address these limitations by providing the foundational knowledge required to design ethically grounded, data-informed smart city frameworks at the metropolitan scale. Students will explore how to align strategic development goals with global sustainability agendas, positioning spatial planning as a primary catalyst for societal benefit. Through a systematic, multi-scalar curriculum, students will examine advanced spatial analytics, predictive modeling concepts, complex urban simulation algorithms, and integrated IoT or digital-twin frameworks. Students will learn to proactively shape urban technology rather than merely reacting to it, while critically addressing the social and ethical implications of technological determinism. By analysing high-impact collaborations across government agencies, tech industries, and disciplines such as sociology, public policy, and big-data intelligence, students will gain the essential domain knowledge needed to integrate emerging socio-technical concepts into future real-world pilots and projects across the wider metropolis.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Deconstruct and evaluate how globalisation, population shifts, and national policies shape high-density urban development, smart city frameworks, and metropolitan governance systems under crisis conditions; b) Apply GIS, spatial analytics, and the conceptual foundations of predictive modeling and digital twins to diagnose and visualize infrastructure and environmental systems across the metropolis; c) Formulate integrated, data-informed planning strategies for complex urban challenges (hyper-density, decay, resource

	depletion) using fragmented, unstructured metropolitan-scale datasets; d) Critically deconstruct the ethical and social implications of technological determinism in smart city planning, prioritising socio-spatial equity and resilience; and e) Translate and communicate complex socio-technical systems and spatial design proposals to interdisciplinary stakeholders, including municipal leaders, tech industries, and local communities.
Subject Synopsis/ Indicative Syllabus	This subject is structured around five thematic modules that ground advanced spatial planning, metropolitan systems, and smart city frameworks within the hyper-dense, crisis-prone urban contexts of Hong Kong, Chinese Mainland, and global metropolises. Students will first interrogate the spatial impacts of globalisation, regional governance, and national strategic goals, examining how metropolitan systems navigate rapid urbanisation, demographic shifts, and environmental crises. The syllabus then transitions to spatial informatics, where students deploy Geographic Information Systems (GIS), predictive modeling concepts, and digital-twin frameworks to diagnose and simulate complex, city-scale systems under conditions of fragmented or unstructured datasets. Furthermore, the subject analyses the planning and management of critical infrastructure, contrasting traditional paradigms with sustainable transit-oriented development (TOD), smart mobility, affordable housing policies, and resilient, community-scale designs. Concluding with socio-technical integration and critical urbanism, students will deconstruct the ethical and social implications of technological determinism and algorithmic governance, preparing them to formulate socio-spatially equitable, high-profile design interventions and strategic proposals for future metropolitan developments.
Teaching/Learning Methodology	This subject is delivered as an intensive, discussion-based lecture / seminar or hands-on analytical laboratory and workshop designed to foster critical debate and strategic planning development. Students will engage in highly interactive weekly seminar discussions to deconstruct assigned spatial policies, planning frameworks, and socio-technical concepts, which are systematically grounded through empirical case studies of high-density systems in Hong Kong and global metropolises. Furthermore, the curriculum incorporates collaborative design-laboratory workshops, providing a peer-critique forum where postgraduate students present, analyse, and systematically refine each other's GIS diagnostic portfolios,

	sustainable infrastructure strategies, and metropolitan masterplan pitches under academic and professional guidance.						
Assessment Methods in Alignment with Intended Learning Outcomes							
	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	e
	1. Assignment	30		✓	✓		
	2. Presentation	50	✓		✓	✓	✓
	3. Written Report	20	✓			✓	
	Total	100 %					
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Student will be assessed by three components: an Assignment (30%), Presentation (50%) and Written report (20%). Students will use GIS software to perform a spatial suitability or network accessibility analysis of a real neighbourhood, mapping demographic/crisis trends against infrastructure, using fragmented or unstructured metropolitan datasets for the assignment. A written report of critical review (1,500 words) analysing the friction between a specific high-density management policy, smart technology implementation, and socio-spatial equity, focusing on deconstructing technological determinism in metropolitan planning. A collaborative project where students prepare a master development strategy for a high-density metropolitan sector facing environmental or resource crises. The project must integrate housing, transport networks, and an IoT/digital-twin framework. Deliverables include a visual planning portfolio and an oral pitch to a mock panel of municipal leaders, tech partners, and citizens. A letter grading system will be used to assess students' performance. Students must attain at least a grade of D in the final grade to achieve a passing grade.							

Student Study Effort Expected	Class contact:	
	▪ Lectures / Seminars / Lab and workshops	39 Hrs.
	Other student study effort:	
	▪ Project	60 Hrs.
	▪ Self-Study	33 Hrs.
	Total student study effort	132 Hrs.
Reading List and References	Ahern, J. (2011). From Theory to Practice: Resilience and Spatial Planning. <i>Urban Forestry & Urban Greening</i>, 10(4), 341-342. Batty, M. (2018). <i>Inventing Future Cities</i>. MIT Press. Rani, L., Hurmat, Kaur, B., Arora, R. (2026). Role of AI in Developing Smart Urban Cities and Resilience to Climate Change. In: Srivastav, A.L., Dubey, A.K., Kumar, A., Ouaisa, M. (eds) <i>Climate Resilience: Impact of Quantum Computing and Artificial Intelligence on Urban Planning. Studies in Systems, Decision and Control</i>, vol 637. Springer, Cham. https://doi.org/10.1007/978-3-032-06791-3_10 Yorucu, V., Bekun, F.V., Yitmen, I. (2026). Planning, Design and Construction of Smart and Resilient Urban Cities: Development Frameworks, Pathways and Challenges. In: <i>Modern Approach of Resilient and Sustainable Smart Cities. Sustainable Development Goals Series</i>. Springer, Cham. https://doi.org/10.1007/978-3-032-05715-0_8 Almulhim, A. I. (2025). Building Urban Resilience Through Smart City Planning: A Systematic Literature Review. <i>Smart Cities</i>, 8(1), 22. https://doi.org/10.3390/smartcities8010022	