Subject Description Form

Subject Code	LSGI544
Subject Title	Urban Science and Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The aims of this subject are: 1. To provide the theory and concepts for urban science; the theories of urban systems, including their form, function, and planning; and the application of data-driven approaches to urban challenges. 2. To provide the theory and methodologies in urban geo-informatics, how they emerge from existing disciplines, and what they can do to inform/ transform Smart City planning and development. 3. To equip students with knowledge of methodological skills to work with large-scale urban data, from a variety of sources, to understand and address real-world challenges in the urban context.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate an understanding of the base theories about how cities are shaped and transformed; b. Explain the basic propositions of urban models, and what they tell us (and don't tell us) about the way cities take shape; c. Reflect on the implications of geomatics technology for contemporary cities and smart city planning; d. Understand the role of urban data and informatics technology in the urban science domain and the use of them in applied situations; e. Use different techniques to effectively visualize and communicate outcomes of urban data analytics, including the use of software such as ArcGIS f. Develop teamwork, communication skills, and knowledge retention by engaging in technology-enhanced active learning and flipped classrooms through participation in an online discussion forum.

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<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>

Introduction to Urban Science and Systems: a topical overview of the contributions of urban economics, planning, and geomatics technologies to this area of study
City Structure and Systems: the city as a geographical entity; the evolution of urban structure and theories; and cities as networks and flows
Exploring Urban Issues: application of City Science concepts to exploring topics such as centrifugal (expansion and sprawl) and centripetal (agglomeration) urban growth; transport and land use; urban design and housing; citizen participation and governance; and urban policy and planning in the age of the Smart City
Tools for Applied Urban Analytics: introduction to the use of geomatics technologies and informatics to explore issues in Urban Science, including spatial analysis and modelling, network analysis, and urban simulations (e.g., spatial interaction, cellular automata, agent-based simulation), and urban economic and demographic forecasting.
Urban Science and the Future of Cities: reflecting on the role of Urban Science and Systems in smart city planning and development for economic, social, and environmental sustainability; and the link between Urban Science and Systems and Urban Informatics.

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<tr><td>Teaching/Learning Methodology</td><td>Students will obtain the theories and methodologies in normal lectures. Students will then gain the practical experience through well-designed individual projects in tutorial sessions. A group project will then follow to develop students' high-level cognitive understanding and integration of knowledge, and develop their teamwork and presentation skills.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td><td>e.</td><td>f.</td></tr>
<tr><td>1. Assignment 1</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Assignment 2</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Project</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Continuous assessment will be used to assess students' basic understanding of the theories, methods, and techniques involved in urban science. In assignment 1, students will be asked to deliver a short essay reviewing the theoretical developments of urban science and systems. Assignment 2 will ask students to choose a specific domain (e.g., urban transportation, urban governance, urban crime and security, urban energy, etc.) and write an essay, detailing the technological
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	developments that underpin relevant applications. A project will test students' knowledge on various concepts pertinent to urban science and systems, and how to use relevant technologies under different environments.	
Student Study Effort Expected	**Class contact:**	
	▪ Lecture	30 Hrs.
	▪ Tutorial	9 Hrs.
	Other student study effort:	
	▪ Self-study, reading and revision	39 Hrs.
	▪ Assignments and projects	39 Hrs.
	Total student study effort:	117 Hrs.
Reading List and References	Batty, M. (2013) The New Science of Cities. MIT Press. (@Library: HT166 .B38667 2013 or Online) Kaplan, D. H., J. O. Wheeler, S. R. Holloway, & T. W. Hodler (2004). Urban Geography. John Wiley & Sons, Inc. ISBN 0-471-35998-X O'Sullivan, A. (2007). Urban Economics (Eighth Edition). McGraw-Hill/Irwin. (@Library: HT321 .O88 2012) Townsend, A. (2013) Smart Cities: Big Data, Civic Hackers and the Quest for a New Utopia. W.W. Norton & Co, New York. (@Library: HT119 .T65 2013) Shi, W.Z., Goodchild, M.F., Batty, M. and Kwan, M.P. (2019). Urban Informatics, Springer. (Forthcoming).	