Subject Description Form

Subject Code	LSGI545
Subject Title	Urban Informatics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	Urban Informatics is a transdisciplinary field primarily involving urban science, urban systems and applications, urban sensing, urban big data infrastructure, and urban computing. This course will provide a hands-on introduction to the tools, technologies, and practical approaches used to collect, analyze and apply large and geographically-rich urban data. The aims of this subject are: a. to apply the existing and new methods of urban sensing to a variety of practical issues in urban planning and Smart City development; b. to describe urban informatics from the perspectives of technologies and principles in computing science and urban modelling; c. to utilize their knowledge of the theories, methods, and tools of urban informatics to better understand and plan cities; d. to develop organizational, interpersonal teamwork, and presentation skills through group projects and participation in class discussions.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. demonstrate their understanding of urban informatics and the base theories and concepts related to urban sensing and urban computing; b. know essential technologies and methods to sense the city; c. relate urban data to computing science and urban modeling; d. use advanced software tools to develop urban models; e. utilize different techniques to effectively present and communicate outcomes derived from their analysis.
Subject Synopsis/ Indicative Syllabus	• *Introduction to Urban Informatics*: An introduction to urban informatics, including urban science, urban systems and applications, urban big data infrastructure, urban sensing, and urban computing, with a particular focus on the latter two. • *Sensing the City*: Introductions to both traditional and untraditional sensing technologies and methods for cities, including urban satellite images, urban positioning and navigation, and Internet of Things (IoT). • *Explaining the City*: Exploring urban systems through advanced urban computing methods, including artificial intelligence & deep learning, agent-based modelling, urban microsimulation and uncertainty analysis. • *Urban Informatics in Context*: The wider social, economic, political, and environmental context of urban informatics, including urban planning and Smart City development; citizen participation and governance;

<table>
<tr><td></td><td>volunteered and open data; urban sustainability; artificial intelligence; privacy.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The learning approach adopted in this class is a progression from knowledge to concept to practical experience to project planning, with examples of real-world projects. Specifically, lectures will introduce key components. Practical sessions will focus on hands-on experiences using advanced tools. The test and assignment will reinforce subject materials, and the group project will allow students to develop and use their skills in urban computing to solve real urban problems.</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="5">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></tr>
<tr><td>1. Test</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Assignment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>3. Group Project and Presentation</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="5"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

It consists of 100% continuous assessment through a test (30%), an assignment (40%), and a group project and presentation (30%). Students will be assessed on their understanding of urban informatics and those essential urban sensing technologies and urban computing methods. Later in the course, students will engage in a group project culminating in a presentation, where they will demonstrate their knowledge of urban informatics related to a particular urban issue (e.g., human mobility). They will use advanced software tools to develop urban models and then present their models and outcomes in class.
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study, reading and revision</td><td>48 Hrs.</td></tr>
<tr><td>▪ Assignments and projects</td><td>30 Hrs.</td></tr>
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	Total student study effort:	117 Hrs.
Reading List and References	Text book: • Shi, W.Z., Goodchild, M.F., Batty, M., Kwan, M.P. and Zhang A.S. (eds.) (2021) Urban Informatics. Springer: Singapore, 941 pages. • Crooks, A., Malleson, N., Manley, E. and Heppenstall, A. (2019) Agent-based Modelling and Geographical Information Systems. SAGE Publications Ltd: London. • Singleton, A.D., Spielman, S.E. and Floch, D.C. (2018) Urban Analytics. Sage: Los Angeles. • Longley, P.A., Goodchild, M.F., Maguire, D.J. and D.W. Rhind (2015) Geographic Information Systems and Science (Fourth Edition). Wiley: Chichester. • Yang, X. (2011). Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment. John Wiley & Sons. • Batty, M. (2007) Cities and Complexity: Understanding Cities with Cellular Automata, Agent-based Models, and Fractals. The MIT Press. Typical journal articles (as assigned): • Urban Informatics • Environment and Planning B: Urban Analytics and City Science • Remote Sensing of Environment • Computers, Environment and Urban Systems • GPS Solutions • International Journal of Geographic Information Systems • Landscape and Urban Planning • Transactions in Intelligent Transportation Systems • Transportation Research Part C: Emerging Technologies • Urban Studies	