GLOBAL SUMMER PROGRAMME 2024

COR-MGMT2207 INNOVATIONS FOR ASIA'S SMART CITIES

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A. COURSE DESCRIPTION

The world is rapidly urbanizing. More and more cities in Asia and around the world are becoming increasingly popular as economic powerhouses and magnets for rural migrants. All big cities in both First and Third World countries such as New York, London, Tokyo, Paris, Shanghai, Hong Kong, Singapore, New Dehli, Jakarta etc. have to cope with high population density and serious challenges such as air pollution, traffic congestion or waste management. How do we pack more people into big cities and yet continue to achieve a high quality of life? How do we create and manage 'good cities' which are safe, spacious, green, connected, fair and resilient? How can cities create economic wealth while still fulfilling the CSR responsibilities of sustaining a "Green Planet"? What are the best practice designs and technical 'smart city' solutions which could be leveraged to tackle these challenges and how can they be successfully commercialised? This course will provide answers to these questions with special emphasis on the managerial and commercial aspects of smart city concepts.

The key lies in creating and effectively managing innovative and sustainable ("smart") cities able to leverage on new technologies such as smart grids or sensor networks to create a place where people can live, play and work well. Starting from the stakeholder requirements of citizens and planners of innovative cities, the course will introduce students to urban design concepts as well as commercialization, management challenges and implementation issues of the smart city model. There will also be a focus on how good governance and enabling technologies such as IoT (Internet of Things) can facilitate the creation, management and sustainability of 'good' cities in Asia and beyond.

With the help of case studies and resource persons such as industry leaders, innovative city designers and tech experts from relevant Singapore-based organisations, students will be familiarized with the opportunities and challenges of the 'smart city business' with special reference to Singapore's 'Smart Nation' strategy.

B. LEARNING OBJECTIVES

The overall objective of this module is to equip students with core knowledge of appreciating what it takes to plan, design, build and sustain cities that are innovative and sustainable and to know the challenges of successfully 'selling' new smart city concepts amidst increasing competition in this field.

By the end of this course, students will be able to appreciate the following 4 areas:

Taxonomy of Innovative & Sustainable Cities

- Describe the core characteristics of a Smart City and respective concepts
- Explain the unique characteristics of each component and how it adds value to innovative and sustainable (smart) cities

Design of Innovative & Sustainable Cities

- Understand the planning and design principles of Innovative & Sustainable Cities
- Explain the workings of each component of Innovative & Sustainable Cities

In-depth study of selected (Mega) Cities

- Be familiar with the challenges of selected mega cities around the globe and understand how the smart city concept can add value in terms of liveability

Commercialisation of the Smart City Concept

- Appreciate the challenges in successfully commercializing smart city concepts and applications based on local and international (good practice) examples
- Know some of the key players in the Singapore context which are involved in this service sector and establish network contacts

C. PRE-REQUISITES / REQUIREMENTS / MUTUALLY EXCLUSIVE COURSES (IF ANY)

This course does not require any pre-requisite.

D. ASSESSMENT METHODS / GRADING DETAILS

Cumulative assessment (CA) constitutes 100% of the final grade, consisting of:

1. **Individual Assessments: 50% of total, consisting of**	
Class Participation	**15%**
Term Paper	**20%**
Quiz	**15%**
2. **Group Assessments: 50% of total, consisting of**	
Group Project #1 (Field Trip) Group Project #2	**20%** **30%**
Total	**100%**

E. ACADEMIC INTEGRITY

All acts of academic dishonesty (including, but not limited to, plagiarism, cheating, fabrication, facilitation of acts of academic dishonesty by others, unauthorized possession of exam questions, or tampering with the academic work of other students) are serious offences.

All work (whether oral or written) submitted for purposes of assessment must be the student's own work. Penalties for violation of the policy range from zero marks for the component assessment to expulsion, depending on the nature of the offense.

When in doubt, students should consult the instructors of the course. Details on the SMU Code of Academic Integrity may be accessed at http://www.smuscd.org/resources.html.

F. ACCESSIBILITY

SMU strives to make learning experiences accessible for all. If students anticipate or experience physical or academic barriers due to disability, please let the instructor know immediately. Students are also welcome to contact the university's disability services team if they have questions or concerns about academic provisions: included@smu.edu.sg.

Please be aware that the accessible tables in the seminar room should remain available for students who require them.

G. INSTRUCTIONAL METHODS AND EXPECTATIONS

COR-MGMT2207 is 100% face-to-face.

The course approach is based on both analytical rigor and the practical utilisation of Smart City principles and concepts. During the course, a variety of synchronous and asynchronous teaching and learning techniques will be employed to enable students to think critically and imaginatively about the various implications of the topic.

Individual Assessments

Class Participation: Students are encouraged to ask questions and offer your opinions in class. Active and well-thought-through discussions are expected from all students. The Rubrics for class participation can be found in Annex B.

Term Paper: Each student will be assigned one smart city topic. You have to do thorough research on the topic and produce a paper of between 1800 and 2000 words. If you are unsure how to structure the term paper, as a guide, you can use the Who, What, When, Where, Why, and How format to organize your term paper. Citations are to be in APA format. The Rubrics for the term paper can be found in Annex B.

Please refer to a separate file in eLearn for the allocation of Term Paper topics in Week 1.

Group Projects: Students will work on two group projects. Each project group will comprise 5-6 students; you can form your own groups.

Group Project #1
Please refer to Annex A for the Scope of Group Project #1 (Field Trip).

Group Project #2
Students will work on one group project related to Smart City (SC) applications and related challenges aimed at solving specific urban problems. Each project group will comprise 5-6 students; you can form your own groups. Each group will be assigned one of the following topics to do research on:

1. Energy (carbon) crisis and living energy lab
2. Indoor air quality management
3. Urban climate change mitigation and adaptation
4. Cycling in a Tropical City
5. Smart Nation sensor platform

All groups are encouraged to study the allocated topic with special reference to smart city concepts such as the EU Smart Cities framework: www.smart-cities.eu/model.html

No report is required. Each team is required to do a 20-minute presentation in class during Session 12. Please refer to the FAQ file for more information. The Rubrics for the group project can be found in Annex B.

H. CLASSROOM POLICIES

The course is taught in three 3-hour sessions per week; total of 12 sessions.

A high level of student participation is required both in the classroom and in the assignments. Students are required to read widely and to participate actively in projects, presentations, team discussions and in-class discussions. A key assumption is that knowledge is constructed by learners and not merely absorbed from textbooks and people with more experience.

I. IMPORTANT ASSIGNMENT DEADLINES

1.	Term Paper:	Lesson 9
2.	Quiz	Lesson 11
3.	Group Project #1:	Lesson 7
4.	Group Project #2:	Lesson 12

J. CONSULTATIONS

Consultation hours with the lecturer(s) will be via appointment to be made via email.
Consult Instructor, Thomas Menkhoff for Group Project #2.
Contact co-Instructor, Kan Siew Ning, if you have questions on Group Project #1 and the term paper.

K. RECOMMENDED TEXT / READING LIST / CASE STUDIES LIST

Main Textbook:

- Menkhoff, T., Kan, S.N., Evers, H.-D., and Chay, Y.W. (2018). Living in Smart Cities: Innovation and Sustainability. World Scientific **(a complimentary copy of the e-book will be made available on LMS).**

Introductory Reading:

- Menkhoff, T. et al. (2018). Introduction: What Makes a City "Smart"? In: Living in Smart Cities: Innovation and Sustainability. World Scientific, pp. 1-60.

Additional Readings:

Additional readings from various sources will be assigned for each class session.

Useful Links

The following links may be useful to students doing research for this module.

- http://cities.media.mit.edu/
- http://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/
- http://www.eu-smartcities.eu/
- http://www.smart-cities.eu/

LESSON PLAN		
LESSONS & FORMAT	**SESSIONS**	**REMARKS**
LESSON 1 Tuesday 25 June	**INTRODUCTION: SINGAPORE THEN AND NOW** • Welcome to Singapore: A "Good" City … **TAXONOMY OF INNOVATIVE & SUSTAINABLE CITIES** • What is a Smart City? Mega City vs. Smart City • Smart City frameworks and rankings of smart cities **Course Outline Specifics and Deliverables** *Textbook Chapter: Introduction (pp. 1 - 60) and Textbook Chapter 15: Singapore – From Knowledge City to Start-up Hub*	Siew Ning Thomas
LESSON 2 Wednesday 26 June	**URBAN PLANNING 101** • What is urban planning and why is it important? • Components of urban planning • Examples of good urban planning and tools used • The role of urban planning in smart city governance *Textbook Chapters 1-3: Singapore's Vision of a Smart Nation — Thinking Big, Starting Small and Scaling Fast by Foo See Liang and Gary Pan; Towards a Smart Nation — It's About People, Ultimately by Poon King Wang and Lim Wee Kiat; Country 2.0 — Upgrading Cities with Smart Technologies by Steven Miller*	Siew Ning
LESSON 3 Thursday 27 June	**SINGAPORE'S WATER STORY & NATIONAL SUSTAINABILITY MOVEMENT** • Singapore's water needs, PUB and the role of Marina Barrage (a dam built across the 350-metre wide Marina Channel to keep out seawater) • PUB's new role as the nation's coastal protection agency • Sustainable development defined - Sustainable development goals • Climate change matters • Singapore's national sustainability movement: Singapore Green Plan 2030 *Textbook Chapter 4: Making Sustainable Creative/Cultural Space in Shanghai and Singapore by Lily Kong* *Textbook Chapter 9: A Case Study of DTSS*	Thomas
LESSON 4 Tuesday 2 July	**SINGAPORE: SMART ECONOMY COMPONENTS** **Excursion: Site Visit (TBC)** • Smart urban leadership, governance and innovation	Thomas

	• Role of knowledge clusters and knowledge hubs • Case study: Offshore Marine Cluster • Commercialising innovative smart city concepts *Textbook Chapter 8: Knowledge Cluster Development through Connectivity: Examples from Southeast Asia by Hans-Dieter Evers, Solvay Gerke and Thomas Menkhoff*	
LESSON 5 Wednesday 3 July	**SMART R&D MANAGEMENT** • Tech clusters, science & technology parks • Players in the R&D ecosystems • Examples: Silicon Valley (USA), Tel Aviv (Israel) **SMART PRISONS** • People, Process, Technology *Textbook Chapter 19: Implementation of Smart Prisons by Kan Siew Ning*	Siew Ning
LESSON 6 Thursday 4 July	**Group Project #1 (Field Trip)** *(*) There will be no class for this session. Students are given time to do the Group Project #1. Your group can use this time to conduct any of the pre-visit, visit and post-visit activities.*	All Project Groups
LESSON 7 Tuesday 9 July	*** Due Date for Group Project #1 (Field Trip presentation)** **(All groups to present in class; 15 min per presentation)**	Thomas Siew Ning
LESSON 8 Wednesday 10 July	**SENSORS ALONE DON'T MAKE US SMART – PEOPLE DO!** • The 'burden' of creating sustainable and liveable urban spaces • 'Smart' cities should not make us 'dumber' – Lessons learned in Singapore, Berlin and Barcelona • Air pollution matters • How to commercialise ideas in support of innovative ('smart') city concepts? *Textbook Chapter 5: What Makes a "Smart" City Liveable? By Linda Low* *Videos to be watched:* Transforming cities with technology (by the Economist) https://www.youtube.com/watch?v=hRY-ZUlJXY0&feature=youtu.be Smart Cities (Knowledge at Wharton) https://www.youtube.com/watch?v=TGiBfw3I2zw Building a Smart City: Lessons from Barcelona https://cacm.acm.org/magazines/2018/4/226370-building-a-smart-city/abstract	Thomas

LESSON 9 Thursday 11 July	**DUE DATE FOR TERM PAPER** **Excursion: Site Visit (TBC)**	Thomas
LESSON 10 Tuesday 16 July	**SMART MOBILITY – OVERVIEW & LAND TRANSPORT** • Teleworking: Role of ICT as enabler of smart mobility • Categories of land transportation • Policy issues related to public transport • Driverless cars • Road planning & design • Road traffic management *Textbook Chapter 17: Alleviating Urban Traffic Congestion in Smart Cities by Sock-Yong Phang – selected pages*	Siew Ning
LESSON 11 Wednesday 17 July	**PART 1: QUIZ** **PART 2: SMART LIVING: INTELLIGENT BUILDINGS** • What makes a building "smart"? • Residential buildings • Commercial office buildings • How can buildings become more intelligent? *Textbook Chapter 6: Technologies for Ageing-in-Place: The Singapore Context by Nadee Goonawardene et al.*	Siew Ning
LESSON 12 Thursday 18 July	**DUE DATE FOR GROUP PROJECT #2** (All groups to present in class)	Thomas Siew Ning

ANNEX A: DESCRIPTION OF GROUP PROJECTS
GROUP PROJECT #1: FIELD TRIP

Each group will do your own research at the group level – you can do the field trip any time after Session 1. Your group will be allocated one of the following places of interest in Singapore and you have to:

1. Pre-visit: Do research on the site.
2. Session 6: Visit the site, take photos, study the posters/signboards if any.
3. Post-visit: Preparation for in-class presentation
4. Session 7: Presentation in class

	Location	**Area of Focus**
1	SMRT interchange (Dhoby Ghaut)	Smart mobility
2	Botanic Gardens	World heritage site / CDL Green Gallery
3	Esplanade Theatres	Cultural entertainment
4	Marina One	Mixed-use development / sustainable design
5	Hub at Jurong East	Building a town hub
	SPARE: Changi Airport	Aviation Hub, shopping, eating

Important Notes:

(A) Before the Field Trip, other than reading about the site, you should first familiarize yourself with the EU Smart Cities framework: www.smart-cities.eu/model.html

(B) You are to look for similar features in other smart cities around the world.

The Group Project #1 deliverable is a 20-minute presentation in class during session 7. No report is required.

GROUP PROJECT #2

	PROJECT TITLE	**DESCRIPTION / SCOPE**
1	Cycling in a tropical city	The overall goal is to propose ways to nudge people to cycle more in a tropical city. Imagine your group plays the role of the city government. Your job is to propose an eco-friendly mobility (cycling) strategy and an implementation plan to motivate car owners to cycle to work. For a definition of nudging, refer to Table 1.
2	Urban climate change mitigation	The overall goal is to achieve greater citizen participation in efforts to mitigate urban climate change. You are the mayor of a big city and your objective is to get citizens living in your city to surface ground-up ideas to slow down global warming and in the process, take ownership of projects that are selected for funding by your city government. You are to propose a strategy and an implementation plan. For a definition of citizen participation, refer to Table 2.

3	Indoor air quality management	Your overall goal is to achieve better indoor air quality management in the context of 'Smart Homes'. Imagine your group plays the role of an expert consultant to a very big and established MNC who wishes to expand its market-dominant outdoor air quality technologies and solutions into the smart homes sector. Your job is to propose a strategy and an implementation plan. For an overview of indoor air quality, refer to Table 3.
4	PPPs: Energy (carbon) crisis and living energy lab	Your overall goal is to leveraging public-private partnerships (PPPs) to create a 'living energy lab' plan to mitigate the energy crisis (e.g. with focus on solar energy). You have been employed by the university to be the director of the proposed living lab. Your job is to propose a strategy and an implementation plan. For an overview of PPP and living lab, refer to Table 4.
5	Smart Nation sensor platform	Your overall goal is to leverage Singapore's Smart Nation Sensor Platform (an integrated, nationwide platform that uses sensors to collect essential data that can be analysed) to create a new 'smart solution' aimed at reducing traffic noise pollution. Your job is to propose a strategy and an implementation plan to reduce noise pollution at Bras Basah Rd near SMU. For more information, refer to Table 5 and: https://www.smartnation.gov.sg/initiatives/strategic-national-projects/smart-nation-sensor-platform.

The Group Project #2 deliverable is a 20-minute presentation in class during session 12. No report is required.

TABLE 1: Definitions of Nudging

The idea behind 'Nudge' was that by exploiting traits of 'human nature' such as our tendencies to put of making decisions, or to give into peer pressure, it was possible to 'nudge' people into making certain decisions. https://revisesociology.com › 2018/07/25 › nudge-politics...
What is a social nudge? As defined by Thaler and Sunstein, the concept is as follows: "A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not." https://blog.prototypr.io/designing-micro-interactions-for-a-social-nudge-a-design-research-1d224f7828ea
What is nudging in psychology? The idea is to apply the techniques of the psychology of decision making and behavioural economics to improve decisions without limited choices. Or easier put, help people make better choices for themselves without restricting their freedom of choice. https://suebehaviouraldesign.com/nudging/
Nudge theory is a concept in behavioral economics, political theory, and behavioral sciences[1] that proposes positive reinforcement and indirect suggestions as ways to influence the behavior and decision-making of groups or individuals. Nudging contrasts with other ways to achieve

compliance, such as education, legislation or enforcement. https://en.wikipedia.org/wiki/Nudge_theory

TABLE 2: Citizen Participation

Public participation, also known as citizen participation, is the inclusion of the public in the activities of any organization or project. Generally public participation seeks and facilitates the involvement of those potentially affected by or interested in a decision. This can be in relation to individuals, governments, institutions, companies or any other entities that affect public interests. The principle of public participation holds that those who are affected by a decision have a right to be involved in the decision-making process. Public participation implies that the public's contribution will influence the decision. Public participation may be regarded as a form of empowerment and as vital part of democratic governance. https://en.wikipedia.org/wiki/Public_participation
BLOG ARTICLE: The Theory of Citizen Participation https://pages.uoregon.edu/rgp/PPPM613/class10theory.htm

TABLE 3: Indoor Air Quality (IAQ)

Indoor air quality (IAQ) is the air quality within and around buildings and structures. IAQ is known to affect the health, comfort, and well-being of building occupants. Poor indoor air quality has been linked to sick building syndrome, reduced productivity, and impaired learning in schools. https://en.wikipedia.org/wiki/Indoor_air_quality
Smart homes and the control of indoor air quality https://www.sciencedirect.com/science/article/pii/S1364032118304040

TABLE 4: Overview of PPP (Public-Private Partnership) and Living Lab

Definition of PPP. PPPs present a framework that—while engaging the private sector—acknowledge and structure the role for government in ensuring that social obligations are met and successful sector reforms and public investments achieved. (Asian Development Bank)
VIDEO (5 min): A quick introduction to Public-Private Partnership https://www.youtube.com/watch?v=KWfqaZrLqhI
PPP Handbook (Asian Development Bank) – Read Chapter 1 of: www.adb.org/documents/public-private-partnership-ppp-handbook
Definition of Living Lab. A living lab, or living laboratory, is a research concept, which may be defined as a user-centered, iterative, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region or campus), integrating concurrent research and innovation processes within a public-private-people partnership. https://en.wikipedia.org/wiki/Living_lab
VIDEO (4 min): Living Laboratory for Sustainability: A platform for research and action https://www.youtube.com/watch?v=dmDoSOv85o0

TABLE 5: Smart Nation Sensor Network

Singapore's Smart Nation Sensor Platform is an integrated, nationwide platform that uses sensors to collect essential data that can be analysed to create new smart solutions. Website: https://www.smartnation.gov.sg/initiatives/strategic-national-projects/smart-nation-sensor-platform (VIDEO from min 22-35)

Noise pollution in the EC https://www.eea.europa.eu/articles/noise-pollution-is-a-major How Paris plans to become less noisy https://www.weforum.org/videos/paris-installs-noise-sensors-to-tackle-noise-pollution
VIDEO (23 mins): Noisy Singapore? How Noise Pollution Is Affecting Us https://www.youtube.com/watch?v=d2P-qDA8q34 https://www.channelnewsasia.com/cna-insider/too-much-noise-can-harm-your-health-thats-potentially-problem-singapore-2350251 https://www.lta.gov.sg/content/dam/ltagov/industry_innovations/industry_matters/safety_health_environment/construction_safety_environment/environmental_protection/pdf/NOISE_GUIDANCE-DEVELOPING_A_NOISE_MANAGEMENT_PLAN_v2019.pdf

ANNEX B: RUBRICS

RUBRIC FOR CLASS PARTICIPATION

A grade	B grade	C grade
• Actively participates at appropriate times • Fully prepared at almost every session • Comments are relevant and reflect good understanding and insight of the teaching materials and topic being discussed	• Sometimes participates but at other times is "tuned out" • Fully prepared for more than half of the sessions • Comments are sometimes relevant; partial understanding of topic being discussed	• Seldom participates and is generally not engaged in discussions • Prepared less than half of the time • Comments are seldom relevant; does not show understanding of topic being discussed

RUBRIC FOR INDIVIDUAL TERM PAPER

A grade	B grade	C grade
• Extensive research work done • Very clear understanding of the subject matter and scope. • Excellent, thorough analysis • Insightful comments & recommendations • Style of writing is very clear and engaging	• Sufficient research work done – using mainly Internet sources • Reasonably clear understand-ing of subject matter and scope • Good analysis • Comments & recommend-ations are above average • Style of writing is quite clear and manages to get the message across	• Partial research work done • Subject matter is not fully understood. Scope is incomplete (*). • Analysis is average • Gaps in comments & recommendations • Style of writing is unclear at least half the time

RUBRIC FOR GROUP PROJECT #1 (FIELD TRIP)

C grade	B grade	A grade
• Pre-visit research work is only partially done – it covers only basic background information of the site. • Below average alignment to the EU smart city framework. • Presentation highlighted less than 75% of the features of the allocated site. • Presentation was boring and could not properly engage the audience.	• Pre-visit research work is good and covers all the key features and some minor features of the site. • Above average alignment to the EU smart city framework. • Presentation highlighted more than 80% of the features of the allocated site. • Presentation was interesting and kept more than 50% of the audience at full attention.	• Excellent pre-visit research work that covers all major and minor features of the site. • Good alignment to the EU smart city framework. • Site visit information collected was insightful and highlighted almost 100% of the features of the allocated site. • Presentation was very engaging and kept the audience at full attention.

RUBRIC FOR GROUP PROJECT #2

A grade	B grade	C grade
• Excellent research work that covers all major and minor smart features of the city. • Presentation materials are insightful and highlighted almost 100% of the smart features of the allocated city. • Excellent presentation style and method. Audience is constantly captivated.	• Research work is good and covers all the key smart features and some minor features of the city. • Presentation materials highlighted more than 80% of the features of the allocated city. • Presentation style and method is good. Engages the audience most of the time.	• Research work is only partially done – it covers only basic information of the city and its smart features. • Presentation materials highlighted less than 75% of the features of the allocated city. • Presentation style and method is average. Audience loses attention after a while.