



GLOBAL SUMMER PROGRAMME 2023

IS463 DIGITAL TECHNOLOGIES FOR ENVIRONMENTAL SUSTAINABILITY

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A. COURSE DESCRIPTION

The efficient management of our shared resources and the way we dispose of waste and pollutants are crucial to achieving responsible consumption and production. Encouraging industries, businesses, and consumers to recycle and reduce waste is necessary, as is supporting consumers to move towards a more sustainable pattern of consumption. This forms the basis of SDG12: Responsible consumption and production, which includes the following targets¹

1. Substantially reducing waste generation through prevention, reduction, recycling, and reuse
2. Reduce food waste along the supply chains, retail, and consumer levels
3. Ensure that people have the relevant information and awareness for sustainable development.

Digital Technologies for Environmental Sustainability (in the Singapore context) is a hands-on module which allows students to employ problem solving and prototyping skills using digital technologies to address the above targets. In addition to case studies of how the issue of Responsible consumption and production is tackled by various Singapore organizations, communities and businesses, they will also be exposed to design thinking, hardware and software prototyping, prototyping tools and technologies (IoT, Microcontrollers, App development, Artificial Intelligence, AR/VR, Metaverse) and will gain first-hand experience in using these tools to prototype a solution to address a challenge statement around environmental sustainability.

B. LEARNING OBJECTIVES

By the end of the course, students will be able to:

- Understand SDG12: Responsible consumption & production and how worldwide consumption & production uses natural environment and resources in a way that leaves a destructive impact on our planet
- Understand the spectrum of innovative digital technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Mixed reality, Metaverse and how they can be used as tools to address challenges around responsible consumption and production
- Apply the concepts of Design thinking and Business Model generation to develop and validate a product idea that uses innovative technologies to address sustainability related problems
- Design and develop prototypes using digital technologies to address challenges of responsible consumption and production, especially in the Singapore and regional context.

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

This course does not require any pre-requisite.

¹ <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/>

D. ASSESSMENT METHODS / GRADING DETAILS

Type of Assessment	Weight
Chapter Individual Assessment <ul style="list-style-type: none"> Challenges in reaching SDG12 in Singapore and the region (15%) Design thinking, ideation and prototyping (15%) Innovative technologies and applications to Sustainable development(15%) Contribution to group project (10%) 	55%
Course Project (Teams) <ul style="list-style-type: none"> Project proposal pitch (15%) Project video (10%) Project prototype and final presentation (20%) 	45%
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 welcomed 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

Instructional Method	Expectations
Lecture: Total 12	Student must attend and participate in the seminar-room lectures / Microsoft Teams Video Meeting
In class individual and team activities	Students are expected to submit the results of the activities in their folders at MS Teams and/ or via e-learn
Guided Labs	Non-graded class activities to help students gain skills with the digital tools.
Team Project	2 presentations, 1 video

H. CLASSROOM POLICIES

As required per Singapore Management University

I. IMPORTANT ASSIGNMENT DATES

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|----|-------------------------------------|----------------|
| 1. | Assessments per chapter: | Lesson 2, 4, 7 |
| 2. | Team Project / Video Presentations: | Lesson 8, 12 |

J. CONSULTATIONS

- Class general communication is via Telegram group
- Consultation scheduled via email / Telegram/ Teams

K. RECOMMENDED TEXT / READING LIST / CASE STUDIES LIST

- <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/>
- Class notes, articles, and references

LESSON PLAN	
LESSONS	TOPICS
LESSON 1 Tuesday 27 June	<ul style="list-style-type: none"> • Introduction to Sustainable development and SDG12 • Responsible consumption and production in Singapore • Case studies, practical
LESSON 2 Wednesday 28 June	<ul style="list-style-type: none"> • Introduction to Design thinking and prototyping • Project briefing • Overview of enabling innovative technologies to address SDG12 • Case studies, practical • Individual Assessment 1 due (15%)
LESSON 3 Thursday 29 June	<ul style="list-style-type: none"> • Technology enablers – AI • Practical
LESSON 4 Tuesday 4 July	<ul style="list-style-type: none"> • Technology enabler – Microcontrollers and IoT • Practical • Individual Assessment 2 due (15%)
LESSON 5 Wednesday 5 July	<ul style="list-style-type: none"> • Technology enabler – Mobile and Web apps • Practical
LESSON 6 Thursday 6 June	<ul style="list-style-type: none"> • Technology enablers – AR/VR/ Metaverse • Practical
LESSON 7 Tuesday 11 July	<ul style="list-style-type: none"> • Guest lecture (UNDP Youth co-lab (TBC)) • Project brainstorming and ideation • Individual Assessment 3 due (15%)

<p>LESSON 8 Wednesday 12 July</p>	<ul style="list-style-type: none"> • Lo-fidelity mockups • Project proposal pitching and peer review (15% team assessment)
<p>LESSON 9 Thursday 13 June</p>	<ul style="list-style-type: none"> • Functional prototyping -part 1 • Project consultations
<p>LESSON 10 Tuesday 18 July</p>	<p>FIELD TRIP: Singapore Urban Redevelopment Authority (URA) Centre / Sustainable City Gallery (Details to be confirmed)</p>
<p>LESSON 11 Wednesday 19 July</p>	<ul style="list-style-type: none"> • Functional Prototyping – part 2 • Project consultations
<p>LESSON 12 Thursday 20 June</p>	<ul style="list-style-type: none"> • Team video submissions (10%) • Team prototype delivery and presentations (20%) • Peer reviews due