



GLOBAL SUMMER PROGRAMME 2024

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) and will gain first hand experience in using these tools to prototype a solution to address a challenge statement around environmental sustainability.

*As the GSP version of the course will use mainly lo-code environments for development, a coding background is not required to take this course.

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) and Artificial Intelligence (AI) 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.

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

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

This course does not require any pre-requisite.

D. ASSESSMENT METHODS / GRADING DETAILS

Type of Assessment	Weight
Individual assessments <ul style="list-style-type: none"> • Class participation (10%) • Quiz (15%) • Assignments (30%) 	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
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, 1 poster and functional prototype

H. CLASSROOM POLICIES

As required per Singapore Management University

I. IMPORTANT ASSIGNMENT DATES

1.	Assignment 1	Lesson 4-Lesson 7
2.	Quiz	Lesson 7
3.	Assignment 2	Lesson 8-12
4.	Team Project / Video Presentations:	Lesson 8-12

J. CONSULTATIONS

- Class general communication is via Teams
- Consultation scheduled via email / 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 25 June	Introduction to sustainability Lab: Environment setup
LESSON 2 Wednesday 26 June	Field trip The objective of the field trip is to enable students to get an overview of local implementations of sustainable solutions using technology. This will help them with the design thinking phase of their project
LESSON 3 Thursday 27 June	Sustainable development frameworks and SDGs Hands on Mobile App development
LESSON 4 Tuesday 2 July	Introduction to digital technologies
LESSON 5 Wednesday 3 July	Digital technologies and environmental sustainability Data Analytics - Lab
LESSON 6 Thursday 4 July	Technology Enablers : AI AI lab 1
LESSON 7 Tuesday 9 July	Technology Enables: AI AI Lab 2 Guest Lecture Quiz (15%) Assignment 1 due (15%)

<p>LESSON 8 Wednesday 10 July</p>	<ul style="list-style-type: none"> • Sustainable solutions using IoT and design thinking • Design thinking lab
<p>LESSON 9 Thursday 11 July</p>	<ul style="list-style-type: none"> • IoT Lab • Project consultations
<p>LESSON 10 Tuesday 16 July</p>	<p>Project brainstorming, design, ideation</p>
<p>LESSON 11 Wednesday 17 July</p>	<p>Project building</p>
<p>LESSON 12 Thursday 18 July</p>	<ul style="list-style-type: none"> • Project presentations and submissions (45%) • Peer reviews • Assignment 2 due (15%)