



GLOBAL SUMMER PROGRAMME 2026

IS463 DIGITAL TECHNOLOGIES FOR ENVIRONMENTAL SUSTAINABILITY

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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, as is supporting consumers to move towards a more sustainable pattern of consumption. This forms the basis of SDG12: Responsible consumption and production.

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 SDG12. 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.

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 digital technologies such as the Internet of Things (IoT), Artificial Intelligence (AI) etc 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
- Analyze the negative impacts of digital technologies and understand the innovations and initiatives that are being developed and implemented to address them
- Design and develop prototypes using digital technologies to address challenges of responsible consumption and production, especially in the Singapore and regional context.

PRE-REQUISITES / REQUIREMENTS / MUTUALLY EXCLUSIVE COURSE(S)

NA

Some coding knowledge is beneficial, though not necessary

ASSESSMENT METHODS

| Assessment Categories | Type | Weightage (%) |
|-----------------------|------------|---------------|
| Class Participation | Individual | 20 |
| Quiz | Individual | 15 |
| Assignment | Individual | 20 |
| Group Project | Group | 45 |
| Total | | 100 |

INSTRUCTIONAL METHODS AND EXPECTATIONS

Class participation (20%)

You are expected to participate in the classroom through sharing your reflections, opinions and questions. Assessment will be based on not just the frequency of your participation, but the depth of your sharing and questions too. Good class participation will also involve listening well to other students and working together towards a collaborative and fruitful discussion. Class participation grades also include completion of weekly class reflections, lab exercises and lab reflections

Grading criteria is not solely based on the frequency of participation but quality of meaningful inputs in the discussions.

Assignment – Individual (20%)

A hands-on lab to apply methods taught in digital technologies as part of progress assessment. Individual students are expected to create a functional prototype for a given sustainability related challenge.

Grading criteria: Use of technology, Creativity and ability to address the problem statement.

Quiz (15%)

Focusing on key concepts taught plus topics from the readings.

Group Project (45%)

Each student is expected to contribute to the team development tech based solution to address a sustainability challenge. The team grade will be based on the technical demonstration, feasibility, impact and ability of the solution to address the business challenge. The project team will run throughout the term and time will be allocated during the lessons to for teams to build the functional prototype. Deliverables: Prototype demo, presentation, video, poster. The project should be done in teams of 3-4 students. Students must form their own groups.

Grading Criteria: Application of Design thinking, Technical complexity, Presentation, Poster, Video

CONSULTATIONS

Project consultations will be scheduled during class hours

Assignment and other consultations can be done online by students.

RECOMMENDED TEXT AND READINGS

A course pack will be offered for this course. There will be no need to acquire a specific textbook.

UNIVERSITY POLICIES

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 <https://smu.sharepoint.com/sites/oasis/SitePages/DOS-WKLSWC/UCSC.aspx>.

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| LESSON PLAN | | |
|-------------|---|---------------------------------|
| LESSONS | TOPICS | REMARKS |
| LESSON 1 | <i>Course Introduction, Introduction to Sustainability and Systems Thinking Lab: Environment setup</i> | |
| LESSON 2 | <i>Field trip briefing Assignment briefing Field trip</i> | |
| LESSON 3 | <i>Sustainability and Digital Technologies 1 Class Discussion and Presentation Lab: Mobile Prototyping 1</i> | |
| LESSON 4 | <i>Sustainability and Digital Technologies 2 Sustainable Business models Project Briefing Lab: Mobile Prototyping 2</i> | |
| LESSON 5 | <i>Sustainability in business processes Introduction to Artificial Intelligence Lab: AI Lab 1</i> | |
| LESSON 6 | <i>AI and sustainability Sustainable Software Development Lab: AI Lab 2</i> | |
| LESSON 7 | <i>Introduction to IoT and Sustainability</i> | |
| LESSON 8 | <i>Lab: IoT lab</i> | Assignment 1 Due |
| LESSON 9 | <i>Design Thinking and Project Brainstorming</i> | |
| LESSON 10 | <i>Quiz Project prototyping</i> | |
| LESSON 11 | <i>Project prototyping</i> | |
| LESSON 12 | <i>Presentation</i> | <i>Project deliverables due</i> |