NAME OF SCHOOL: School of Social Sciences

ACADEMIC PROGRAMME: Master of Sustainability

INSTRUCTOR: Andrew Koh

DATE OF SUBMISSION: Oct 2024

SECTION A – FOR COURSE APPROVAL

COURSE CODE: [To be generated by RO]

COURSE TITLE:

Digital Technologies for Global Sustainability: Practical Solutions for Industry

COURSE DESCRIPTION

In a world grappling with urgent sustainability challenges, digital technologies offer a transformative pathway to bridge the gap between current progress and ambitious global targets. This course equips students from all backgrounds with the technical knowledge, practical skills, and critical thinking necessary to address these challenges through innovation.

This cross-disciplinary SMU-X course takes a hands-on, practical approach to leveraging digital technologies—especially Generative Artificial Intelligence—as powerful tools for addressing sustainability challenges across environmental, social, and economic sectors. Designed for students from all backgrounds, including those without technical experience, the course equips you with concrete, transferable skills to implement real-world solutions. At the same time, the rise of digital technologies brings with it environmental and social impacts, and this course emphasizes not only the potential of technology to advance sustainability but also the ethical responsibility to innovate equitably. Study cases will be chosen based on their relevance to the diversity of student experiences represented in the class.

Throughout the course, you will engage directly with leading industry practitioners who will present real-world challenges and insights from the frontlines of sustainability work. These experts will provide invaluable context, helping you to apply what you've learned to the most pressing issues facing industries today. By working on live projects with their guidance, you will develop practical solutions that are ready for immediate application in the workplace, preparing you to drive meaningful change in and through your career to shape a resilient future for both people and the planet.

LEARNING OBJECTIVES

By the end of this course, student will be able to:

1. Develop practical skills in AI to design and prototype sustainable solutions
2. Understand the potential of digital technologies to tackle both the environmental and anthropogenic aspects of sustainability
3. Apply ethical and responsible innovation in the adoption of digital technologies for sustainability

PRE-REQUISITE/CO-REQUISITE/MUTUALLY EXCLUSIVE COURSE(S)

State the requirement of the course, if any

Nil

COURSE AREA

Example: Foundation/Electives/ART/etc

GRADING BASIS

Graded

COURSE UNIT

Example: 1.0 CU/0.5 CU/etc

1.0CU

FIRST OFFERING TERM

Academic Year: AY2024-2025

Academic Term: Term 2

SECTION B - COURSE OUTLINE/ASSESSMENT

ASSESSMENT METHODS

Assessment Categories	Type	Weightage (%)
Class Participation	Individual	20
Quiz	Individual	15
Assignment / Lab	Individual	15
Group Project	Group	50
Total		**100**

ACADEMIC INTEGRITY

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://oasis.smu.edu.sg/Pages/DOS-WKLSWC/UCSC.aspx.

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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.

Quiz (15%)

A written quiz focusing on key concepts taught. The questions will be a combination of MCQs and open-ended question.

Assignment / Lab (15%)

Take-home assignments/lab to apply methods taught in digital technologies as part of progress assessment and deeper familiarization.

Grading Criteria: Content understanding and research depth, critical analysis

Group Project (50%)

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: Alignment to problem statement, presentation, poster

CLASS TIMINGS

Provide information on how the course is taught (how many hours session) per week over a term etc.

The course is taught in one 3-hour session per week over ten weeks, the last being for project presentation. The first one and half hour will usually take the form of seminar or discussions followed by a short break. The rest of the session will be hands on labs and projects.

RECOMMENDED TEXT AND READINGS

There will be no need to acquire a specific textbook. All references and readings will be provided through the course.

WEEKLY LESSON PLAN

Week	Topics	Assignments/Activities/ Lab
1	Course Introduction Intro to AI Problems of sustainability	
2	Sharing of sponsor's problem statement Challenges in sustainability reporting Opportunities for generative AI in sustainability reporting	Application Programming Interface (API) lab
3	Introduction to Large Language Models	
4	Conversational AI (30min) a. Designing conversations b. Retrieval Augmented Generation (RAG) c. Multi-agent LLMs	Google agent app lab 1
5	Consultation and project work	Google agent app lab 2
6	Computer vision a. Human vision b. Convolutional Neural Networks c. Multi-modal LLMs	Multi-modal LLM lab

7	Sharing with sponsor and mid term presentation	
Break		
8	Quiz Psychology of sustainability	
9	Environmental and social impact of technology and innovations	
10	Final Presentations	