GLOBAL SUMMER PROGRAMME 2024

COR-CS2232 INTERNET OF THINGS INNOVATIONS FOR DRIVING BUSINESS GROWTH

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A. COURSE DESCRIPTION

The Internet. Of. Things. A world of smart objects. A world in which trillions of devices can sense, communicate, and collaborate over the Internet. A world where the physical and digital worlds are fused seamlessly into a networked matrix, where everything is interwoven and intertwined and interconnected in one colossal network.

In this course, we embark on an adventure; sometimes challenging, always exciting. We discover the essential elements of the Internet of Things. Sensors. Actuators. Embedded devices that unite the cyber and physical realms. The Internet of Things technologies that weave devices together into the global tapestry of the World Wide Web.

We unleash our creative energies, our youthful idealism, and our capacity to dream, by creating visionary technology to conquer societal challenges. This is a journey into the unknown. Yet, a still, small voice deep within us compels us: Courage! Do not be afraid! Put out into the deepest oceans and brave the stormiest seas! Let down your nets for an awesome catch!

The adventure reaches its peak at the project showcase, where we witness the work of human hands come to fruition, leaving us inspired to reflect deeply and broadly about how we, as global citizens, can harness the power of the Internet of Things as a potent force in the service of humanity.

Sounds lit? Bring some bubble tea, come and see: what's the tea with IoT? #Slayyy

B. LEARNING OBJECTIVES

- Explain concepts related to the Internet of Things
- Develop basic coding skills using the Blocks visual coding language
- Analyze the unique challenges and complexities faced in computing for the physical world
- Apply Design Thinking methods to design, develop, and deploy an Internet of Things prototype to conquer a societal challenge
- Reflect deeply and broadly about the various ways in which the Internet of Things can make immense impact in society, especially to those in need

C. PREREQUISITES / REQUIREMENTS / MUTUALLY EXCLUSIVE COURSES (IF ANY)

- For non-SCIS students only.
- No prior tech knowledge is necessary. This course is pitched at absolute beginners with zero background in tech. However, an interest in learning about tech an basic coding skills is required.
- Students are expected to purchase their own IoT devices, valued at up to S$100. Financial Aid may be provided for students who need it.
- A profound desire to harness the power of technology in the service of the disadvantages and vulnerable.

D. ASSESSMENT METHODS / GRADING DETAILS

Component	Description	Weightage
Class Participation	Make creative, insightful, stimulating, novel contributions, which significantly advance the learning of the class	20%
Technology Review	Create a fun and lively vlog on an Internet of Things solution, sharing your personal thoughts, feelings, reflections, opinions	20%
Project Proposal Pitch	Pitch your innovative ideas, focusing on needs analysis, and a high-level description of your proposed solutions.	20%
Project Showcase	Design, develop, deploy, and demonstrate a working prototype	20%
Project Report	Create a blog article and video to narrate your experience on this adventure, focusing on your solution, prototype, and learning journey	20%

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 offenses.

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

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: dss@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

- The flipped learning method is used.
- Students are expected to complete assigned readings before attending lessons, attend all lessons, contribute actively to discussions, contribute their fair share to the team project, and submit deliverables on time.

H. CLASSROOM POLICIES

- Do all assigned readings before attending the lesson.
- Be curious, be present, be awesome.

I. IMPORTANT ASSIGNMENT DATES

Component	Deadline
Technology Review	Lesson 10
Project Proposal Pitch	Lesson 6
Project Showcase	Lesson 12
Project Report	Lesson 12

J. CONSULTATIONS

By appointment.

K. RECOMMENDED TEXT / READING LIST / CASE STUDIES LIST

- Framework for Cyber-Physical Systems: Volume 1, Overview
- Ethical Aspects of Cyber-Physical Systems

LESSON PLAN	
LESSON	**TOPIC**
Lesson 1 Tuesday 25 June	The Internet of Things • Elements, Applications, Frameworks • Lab: basics, serial communications • Design Thinking: Empathize
Lesson 2 Wednesday 26 June	Embedded Computing • Characteristics, Constraints, Challenges • Lab: variables, event handlers, concurrency • Design Thinking: Define
Lesson 3 Thursday 27 June	Sensors • Properties • Errors in sensed data • Lab: conditionals, sensor inputs • Design Thinking: Ideate
Lesson 4 Tuesday 2 July	Artificial Intelligence • Embedded Machine Learning
Lesson 5 Wednesday 3 July	Crowd Sensing • Managed vs Unmanaged IoT systems • Applications • Design Considerations • Lab: loops, actuators • Design Thinking: Prototype
Lesson 6 Thursday 4 July	Project Proposal Presentation
Lesson 7 Tuesday 9 July	Networking • Networking Basics • Principles of Wireless Communications • Lab: radio • Design Thinking: Test
Lesson 8 Wednesday 10 July	Visual Analytics • Form, Function • Dashboards • Design Thinking: Test
Lesson 9 Thursday 11 July	Architecture • Design Principles • Design Patterns • Lab: systems integration
Lesson 10 Tuesday 16 July	Impacting Humanity Positively • Ethical Considerations for IoT • Tech for Good • Sustainability
Lesson 11 Wednesday 17 July	Field Trip - TBC
Lesson 12 Thursday 18 July	Project Final Presentation