

The Hong Kong University of Science and Technology

UG Course Syllabus

Community Services Project: STEAM Project for the Community

ENGG2900H

2 Credits (graded Pass or Fail)

Pre-requisites: Nil

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Course Description

This Project Course (ENGG2900H) provides HKUST undergraduate students with ample opportunities for personal growth, not only in essential 21st-century competencies - such as Creativity, Critical Thinking, Collaboration, and Communication - but also in acquiring a diverse array of practical skills pertinent to project management through the execution of their STEAM projects. Throughout the course, students will assume the role of Workshop Developers, where they will craft their teaching materials and construct prototypes for instruction. Ultimately, they will serve as Tutors or Assistants, imparting their acquired engineering knowledge and technological expertise to primary and secondary school students. This experience will serve as excellent preparation for aspiring engineers, equipping them to mentor the next generation of professionals in the field. The course will commence in the Summer Semester and extend into the Fall Semester; during the Summer Term, many theoretical concepts will be taught, while community service initiatives will be implemented in the Fall semester.

Topics

- Project Management Basics
- STEAM (Science, Technology, Engineering, Art, and Mathematics) Education
- Relationship between the 21st-century skills and STEM education
- The Basics of STEAM elements – hardware and software
- Design of the workshop and the serious and fun games for education
- Outreach services for servicing the community

Benefits from the Community Service Project

From the perspective of university students, the project offers an opportunity to impart their knowledge of STEAM technology to the target audience. Furthermore, it benefits HKUST undergraduates by fostering their intellectual development beyond the confines of their respective academic disciplines.

Target Served Group (i.e., Primary and Secondary School Students)

The serviced group consists of primary and secondary school students, who will benefit from teaching materials designed by course participants. Through the project, these students will engage with knowledge in Science, Technology, Engineering, Arts, and Mathematics (STEAM).

Role and Responsibilities of HKUST Students

Participants are expected to complete the deliverables outlined in the syllabus, which include preparing proposals and conducting presentations. They should maintain regular communication with the Project Supervisor and/or the School's Project Coordinator, track project progress to ensure timely completion of deliverables, and keep all data and analyses confidential if requested by HKUST. Additionally, they must represent themselves and the university professionally, ensure equal contribution from all students, and prepare a creative self-reflective journal or project detailing their learning experience. Lastly, adherence to university regulations on academic integrity and proper citation practices is essential to avoid plagiarism.

Course Requirements

Each student/group is required to submit the following to the Project Supervisors.

- Deliverables as stated on the Course syllabus:
 - Group Proposal for workshop development
 - Preparations for Service Day
 - Teaching materials and worksheets designed for the workshop
 - Self-reflective Paper
 - Program and Peer Evaluation Forms
- Before the actual service takes place, each group will need to have a presentation for workshop development and receive pre-event recommendations.
- All students must attend all sessions on the listed working schedule in the working schedule below.
- All team members should commit to the agreed due dates and respect the time devotion of the business partner for all interaction – punctuality and good preparation are expected

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

ILO1. Elucidate the foundational concepts of STEM Education, and comprehend the teaching skills being an educator.

ILO2. Understand the basics of project management.

ILO3. Effectively transfer the technological knowledge to the target served group.

ILO4. Effectively writing any proposal/ presentation.

ILO5. Develop and practice the 21st-century skills through the project-based learning of community service.

ILO6. Improve their hands-on experience from idea to deliverables.

ILO7. Have a self-reflection through the project and review their limitation for further self-improvement on his/her 21-st century skills.

Assessment and Grading

This course will be assessed using criterion-referencing, and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Idea Presentation	10%	16/7/2026
Project Proposal	10%	28/7/2026
Project Deliverables	20%	6/8/2026
Community Service	20%	7/11/2026
Closing Project Presentation	20%	14/11/2026
Reflective Report	20%	22/11/2026

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Idea Presentation	ILO1, ILO2	This task evaluates students' understanding of STEAM concepts (ILO1) and their application within the project (ILO2), culminating in an assessment of their presentation skills.
Project Proposal	ILO3, ILO4	This task evaluates students' proficiency in concepts and skills transfer (ILO3) through the composition of an effective proposal (ILO4).
Project Deliverables	ILO5, ILO6	This task offers students an opportunity to hone their practical skills (ILO6) through the engaging method of project-based learning (ILO5).
Community Service	ILO5, ILO6	This task aims to let students learning through hands-on experience (ILO5, ILO6)
Closing Project Presentation	ILO3, ILO4, ILO5	This task enables students to reinforce their learning (ILO3, ILO4) from the project while further refining their pitching skills (ILO5).
Reflective Report	ILO7	This task provides students with a chance to enrich what they have learnt and review for their self-improvement. (ILO7)

Grading Rubrics

Assessment Task	Criteria	Exemplary (4)	Proficient (3)	Satisfactory (2)	Needs Improvement (1)
Idea Presentation (10%)	Clarity of "idea"	"Idea" is exceptionally clear and engaging, with strong connections to STEAM.	"Idea" is clear and relevant, with some connections to STEAM.	"Idea" is somewhat clear, but lacks depth or relevance.	"Idea" is unclear or poorly presented.
	Creativity	Highly creative and original; demonstrates innovative thinking	Some creative elements demonstrate some originality	Limited creativity; relies heavily on existing ideas.	Lacks creativity and originality.
Project Proposal (10%)	Structure and Organization	"Proposal" is exceptionally well-structured; all required components are present.	"Proposal" is well-structured; most components are present.	"Proposal" is somewhat organized; missing some components.	"Proposal" is poorly structured or incomplete.

	Feasibility of Project	“Project” is highly feasible with clear, realistic goals and timeline.	“Project” is feasible with mostly clear goals and timeline.	“Project” has some feasibility issues; goals or timeline are unclear.	“Project” is not feasible; lacks clear goals or timeline.
Project Deliverables (20%)	Quality of work	Deliverables exceed expectations; high quality, thorough, and well-executed.	Deliverables meet expectations; quality is good and mostly thorough.	Deliverables are adequate; quality is fair but lacks depth.	Deliverables are of poor quality or incomplete.
	Application of Theory	Excellent application of theoretical concepts to practical work.	Good application of theory; some connections made to practice	Limited application of theory; unclear connections to practice.	No application of theory to practice.
Community Service (20%)	Engagement and Impact	Highly engaged with the community significant positive impact was observed.	Engaged with the community; positive impact noted	Some engagement with the community; limited impact.	Minimal or no engagement with the community.
	Reflection on Experience	Deep reflection, insightful understanding of community needs, and personal growth.	Good reflection, some understanding of community needs, and personal growth.	Limited reflection; minimal insight into community needs or personal growth.	No reflection or understanding demonstrated.
Closing Project Presentation (20%)	Presentation Skills	Presentation is engaging, clear, and well-rehearsed; excellent use of visual aids.	Presentation is clear and organized; good use of visual aids.	Presentation is somewhat clear; limited use of visual aids.	Presentation is unclear, poorly organized, or lacks visual aids.
	Ability to Answer Questions	Answers questions thoroughly and confidently; demonstrates deep understanding.	Answers questions adequately; shows good understanding.	Answers questions but lacks depth or clarity.	Unable to answer questions or demonstrates poor understanding.
Reflective Report (20%)	Depth of Reflection	Exceptionally deep reflection on learning experiences and project outcomes.	Good reflection on learning experiences and project outcomes.	Some reflection lacks depth or insight into experiences.	Minimal reflection; lacks understanding of experiences.
	Connection to ILOs	Strong connections were made between experiences	Some connections were made between experiences	Limited connections made; unclear link to ILOs.	No connections made to ILOs.

		and intended learning outcomes.	and intended learning outcomes.		
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Scoring

Exemplary (4): 90-100%

Proficient (3): 75-89%

Satisfactory (2): 60-74%

Needs Improvement (1): 0-59%

Final Grade Descriptors:

This is a two-credit course that will span across summer and fall semesters (and is graded Pass ($\geq 60\%$) or Fail ($< 60\%$). The 2 credits will be granted after the whole course has been completed.

Class Size – 20 Students

Working Schedule

The working schedule stated below is subject to change. HKUST reserves the right to make changes in the schedule as deemed appropriate. Any changes will be communicated to all parties concerned.

Summer Semester

Week	Date/Time/Venue	Task
	Start from 30 Apr 2026 (Thu)	<u>Course Registration</u> Students are to enroll in the course by sending an Expression of Interest to the Project Coordinator.
	5 May 2026 (Tue) Time: 15:00 – 16:00 Venue: Zoom	<u>Information Session</u> - Gives a brief introduction of the project and expresses expectations to students - Inform students of the preliminary information about the type of served groups (e.g., primary and secondary school students) - Inform students of the event arrangement on event days and what is expected from the HKUST students
1	Jun 16, 2026 (Tue) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Course Meeting – Kick-off Meeting</u> - Schools to provide details of the project scope - Recap key points of the whole project - Identify key roles and respective detailed responsibilities of all the students <u>Training Session 1 – STEAM Education</u> - Introduction of STEAM Education - Sharing of another STEAM project - Ice-breaking for students
1	Jun 18, 2026 (Thu) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 2 – Hardware Training 1</u> Learn how to apply hardware to STEM education - Introduction to Basic Electronics - How to use specifications for design - Learn how to use hardware in STEM education
2	Jun 23, 2026 (Tue) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 3 – Experiential Learning</u> Experiential learning - Hands-on Practice - Learn how to use the basic elements to develop a STEM activity - Practice your skills through a STEM activity

		- Finally, understand the essential elements for developing an effective workshop - Brainstorm and start to have your workshop idea
2	Jun 25, 2026 (Thu) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 4 – Software and Essential skills for workshop development</u> Learn how to apply software to STEM education - Introduction to Coding - Basic programming and skills - Use coding in STEM education Learn some essential skills for workshop development - Points to be aware of while developing workshops for primary school and secondary school students - Discuss how to implement your workshop - Sharing your preliminary idea with other teams
3	Jun 30, 2026 (Tue) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 5 – Development of hands-on experience</u> - Groups start to develop their prototypes with their idea. - Prototype should be submitted on/before Aug 8 (23:59), - Prototype can be any teaching materials, a user guide designed worksheet, etc. - Other lecture periods can be reserved for your group workshop development (need to have advanced booking)
4	Jul 9, 2026 (Thu) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 6 – Presentation Day</u> Each group presents its idea, and the proposal.
5	Jul 16, 2026 (Thu) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 7 – Prototype Day</u> Each group presents its prototype and presents the first deliverable.
6	No Class	Teams are working on the workshop idea
7	Jul 28, 2026 (Tue) 09:30 – 12:30 (3 hours) Venue: HKUST	<u>Training Session 8 - Rehearsal Practice</u> Students need to showcase their projects and practice what they learned during this session.
8	Aug 6, 2026 (Thu) No Class	Submission of the final prototype on/before Aug 6, 2026 (23:59)
End of Summer Sessions		

Fall Semester

Week	Date/Time/Venue	Task
2	Sep 9, 10, 2026 (Wed – Thu) 12:30 – 15:30 (3 hours) Venue: HKUST	All students needed to participate, except for the official application for exemption.
2	Sep 12, 2026 (Sat) 10:00 – 13:00 Venue: HKUST/Zoom	<u>Training Session 9 – Rehearsal Practice Review</u> - Group discussion – review your rehearsal - Discuss any further improvements on final prototypes and/or documents for the Fall semester service.

5	Sep 27, 2026 (Sun, 23:59)	Each group needs to submit the final prototype and related documents to the school's project coordinator on/before Sep 27, 2026 (23:59)
9	Oct 31, 2026 (Sat) 10:00 – 12:00 (2 hours) Venue: HKUST/Zoom	<u>Service Day - Briefing</u> - Recap the service updated information - Recheck the preparation - Tasks have to be completed on/before Nov 7, 2026.
10	Nov 7, 2026 (Sat) (8 – 10 hours) Venue: HKUST	<u>Service Day</u> - All students must participate in a service day to deliver workshops to the participating schools (~ about 100 participants), except for the official application of the exemption. - Service day around 8 – 10 hours, including lunch period
11	Nov 14, 2026 (Sat) 10:00 – 13:00 Venue: HKUST/Zoom	<u>Training session – Closing Project</u> Group Presentation – Review the whole project from the first day to the final service day.
14	Nov 22, 2026 (Sun, 23:59)	Each student needs to submit the creative self-reflective report, program evaluation form, and/or peer evaluation form to the school's project coordinator at or on Nov 22, 2026 (23:59)
End of Fall Sessions		

Course AI Policy

Students are encouraged to utilize AI for idea generation; however, they must acknowledge its use at any stage of project development or in any submitted documents.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas/email within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback, including marks, should consult the instructor within five working days after the feedback is received.

Resubmission Policy

[If applicable, explain the policy for resubmitting work or reassessment opportunities, including conditions and deadlines.]

Students are expected to complete tasks by the designated deadlines; however, requests for late submissions must be submitted prior to the deadline.

Required Texts and Materials

- McBride, M. (2016). Project management basics. Apress.
- Felder, R. M., & Brent, R. (2024). Teaching and learning STEM: A practical guide. John Wiley & Sons.
- Hynes, M., Portsmore, M., Dare, E., Milto, E., Rogers, C., Hammer, D., & Carberry, A. (2011). Infusing engineering design into high school STEM courses.

- C. Sik-Lanyi and J. Ara, “Serious and Fun Games: Introduction to the Special Thematic Session,” in *Computers Helping People with Special Needs*, Cham: Springer International Publishing, 2022, pp. 67–72.
- Widya, R. Rifandi, and Y. Laila Rahmi, “STEM education to fulfil the 21st century demand: a literature review,” *Journal of physics. Conference series*, vol. 1317, no. 1, pp. 012208-, 2019, doi: 10.1088/1742-6596/1317/1/012208.

Academic Integrity

Students are expected to adhere to the university’s academic integrity policy. Students are expected to uphold HKUST’s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to [Academic Integrity | HKUST – Academic Registry](#) for the University’s definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

[List any additional resources, such as online platforms, library resources, etc.]