The Hong Kong University of Science and Technology

UG Course Syllabus

Fall 2026

Course Title: Communicating Mathematics to the Public

Course Code: MATH 3900

No. of Credits: 1

Prerequisite(s): Nil

Corequisite(s): Nil

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Course Description

This project-based course allows students to develop expertise in mathematics outreach and knowledge transfer, as well as understand industrially and academically relevant skills. The course exposes students to promoting mathematics to the public. Activities may include lectures, seminars, workshops, and sharing sessions. Outputs will be diverse and may consist of exhibits, workshops, or presentations to be delivered in schools, online activities, and digital apps to be posted on websites or social media platforms.

Intended Learning Outcomes (ILOs)

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

1. Create educational material, communicate mathematical knowledge to unfamiliar audiences.
2. Show judgment in the selection and presentation of material to communicate.
3. Demonstrate essential communication skills such as verbal, visual, video, or online/social media communication.
4. Examine the value of and assume ownership of their mathematics education

Assessment and Grading

There is no final examination. Grades are criterion-referenced and are not curved. A typical 40-hour pathway comprises 12 hours of interactive lectures and workshops, 2 hours of seminar, 6 hours of mentoring/checkpoints, 4 hours of showcase, 5 hours of preparation/portfolio work, and 11 hours of project work outside class. The standard project target remains 10-14 hours outside class; ambitious extensions are optional. Projects may be individual or paired when collaboration makes an ambitious format feasible. Pair projects receive a common artifact grade, while the contribution statement and oral defense provide individual evidence that may affect each student's result.

Assessment	Weight	Assessing Course ILOs
Attendance and Participation	20%	1, 2, 3, 4
Learning Portfolio	40%	1, 2, 3, 4
Public Mathematics Web Collection Project	40%	1, 2, 3, 4

Assessments

The three assessment components are designed to reward participation, evidence of learning, mathematical integrity, and purposeful communication—not technical spectacle alone.

1. Attendance and Participation (20%): Preparation, substantive contribution to interactive lectures and workshops, completion of in-class activities, constructive peer critique, and contribution to the project community. Participation may be demonstrated through speaking, written critique, artifact testing, questioning, facilitation, or documented preparation; it is not measured by speaking volume alone.
2. Learning Portfolio (40%): A curated record of selected in-class workshop artifacts and three short reflections showing audience judgment, mathematical checking, choices of language and medium, feedback, and revision. The portfolio is not a dump of raw process material or a weekly set of long reports.
3. Public Mathematics Web Collection Project (40%): A modest public-facing contribution prepared for the class webpage. Each piece must communicate a nontrivial mathematical idea to a defined public audience, use a suitable medium, verify its main claims with two or three key sources, include a short audience test with at least two relevant people, and show one meaningful revision. A concise tool-use note is needed only when a generative system materially contributed. Static and interactive formats are equally welcome. Public posting requires separate permission and is not a condition of receiving a course grade.

Possible formats include mathematical fiction, comics, articles, animations, audio/video, interactive visualizations, games, web explainers, or a combination of media. A common website structure provides coherence while allowing students with different mathematical, linguistic, artistic, and technical backgrounds to contribute in different ways.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Attendance and Participation	ILO1–ILO4	In-class workshops and peer critique require students to frame messages, compare explanations and media, question assumptions, and take responsibility for mathematical and communicative choices.
Learning Portfolio	ILO1–ILO4	The portfolio makes the student's development, source verification, medium and tool decisions, audience evidence, revision process, and reflective judgment visible.
Public Mathematics Web Collection Project	ILO1–ILO4	The final artifact demonstrates audience-sensitive mathematical communication in a chosen medium and is supported by evidence of testing, revision, accessibility, source use, and human ownership.

Grading Rubrics

Assessed Task	Needs Improvement	OK	Excellent
Attendance and Participation	Infrequent preparation or contribution; limited engagement with peers or workshop work.	Generally prepared and engaged; completes activities and contributes useful comments or questions.	Consistently prepared, inquisitive, constructive, and generous in helping the class learn.
Learning Portfolio	Incomplete or descriptive record; weak verification, reflection, or evidence of revision.	Complete record with reasonable evidence of decisions, checking, feedback, and development.	Selective, specific, intellectually honest portfolio with strong verification, reflection, and evidence-based revision.

Assessed Task	Needs Improvement	OK	Excellent
Web Collection Project	Mathematical or audience purpose is unclear; artifact is inaccurate, generic, or insufficiently tested.	Accurate and understandable artifact suited to an audience, with appropriate medium and some evidence of revision.	Mathematically sound, distinctive, engaging, accessible artifact with excellent audience judgment, purposeful tool use, and clear human ownership.

Final Grade Descriptors

The following are general descriptors; official HKUST regulations and grade definitions apply.

Grades	Short Description	Elaboration
A	Excellent	Consistently demonstrates strong mathematical judgment, audience awareness, originality, verification, revision, and ownership across the portfolio, project, and presentation.
B	Good	Demonstrates sound mathematical communication and responsible process, with clear strengths and only limited gaps in depth, audience evidence, or refinement.
C	Satisfactory	Meets the basic course requirements with an understandable artifact and reasonable participation, but shows uneven development, verification, or reflection.
D/F	Insufficient	Does not yet meet the minimum requirements for accurate, responsible, audience-appropriate mathematical communication or completes the work only partially.

Teaching and Learning Activities

Weeks 1-6 are delivered as interactive lectures and workshops. Students work in pairs or small groups, analyze public mathematics artifacts, compare explanations and media, test audience assumptions, and record short reflections during class. Lecture 5 includes a short, tool-neutral sampler covering text, image, audio/video, interaction, translation, and accessibility capabilities; generative tools are included as one optional category and students are not expected to master every tool. Lecture 6 integrates verification, audience testing, and the project pitch. Week 7 is a guest seminar. Weeks 8-11 are focused project mentoring and production checkpoints. Weeks 12-13 are the class showcase, presentations, and oral defense.

A typical two-hour interactive lecture and workshop includes a short concept lesson, a collaborative exercise, peer critique or verification, instructor synthesis, and a brief portfolio capture. Students are not expected to complete a substantial new artifact after every lecture. Multilingual work is welcome when it suits the audience; students should provide an English summary, captions, transcript, or other access route when needed for assessment and the shared collection.

Workload Expectation

The course represents approximately 40 hours of total student work. A typical allocation is: interactive lectures and workshops 12 hours; seminar 2 hours; mentoring/checkpoints 6 hours; showcase 4 hours; preparation and portfolio 5 hours; project outside class 11 hours. Individual timetables and project formats may shift these figures slightly, but the standard project should remain within 10-14 hours outside class. No web-development knowledge or personally paid software subscription is required.

Course Schedule

Week	Class Format	Topic	Reading / Activity
1	Interactive lecture and workshop	Introduction: communicating mathematics to public audiences	Ghys, Sections 1-2; public-artifact analysis, explanation test, course overview, and project introduction
2	Interactive lecture and workshop	The Importance of the Message: audience, purpose, and framing	Rousseau, Section 2; Stewart, Sections 1-3; audience-message workshop
3	Interactive lecture and workshop	The Vocabulary of Mathematics: plain language, analogy, translation, and voice	Ziegler, pp. 710-712; explanation ladder and translation/analogy safety label
4	Interactive lecture and workshop	The Topics: worthwhile mathematics, scope, and trustworthy sources	Ziegler, pp. 713-716; topic matrix, mathematical minimum, and source check
5	Interactive lecture and workshop	The Setting and the Occasion: medium, tool sampler, accessibility, and publication context	Stewart, Section 5; Ziegler, pp. 716-720; one concept in three media
6	Interactive lecture and workshop	The Illusion of Understanding: verification, audience testing, and project pitch	Ziegler, pp. 720-721; claim-and-explanation autopsy, audience-test protocol, and revised charter
7	Seminar	Sharing by a mathematics/science communicator	Guest speaker materials
8–11	Individual/pair mentoring	Project charter, source packet, prototype, audience testing, and revision	Project templates and selected resources
12–13	Presentation/show case	Public Mathematics Web Collection: student demonstrations, peer feedback, and oral defense	Final project materials

Use of Digital and Generative Tools

Students may use digital and generative tools when they improve the communication of mathematics. No student is required to use generative AI, and declining it does not reduce a grade. Tools should support rather than replace audience judgment, mathematical reasoning, authorship, or responsibility. Students remain accountable for every mathematical claim, citation, image, line of code, translation, and design decision they submit or publish.

When a generative tool materially contributes, students provide a concise note naming the tool and purpose, what was adopted or rejected, how the result was checked, and what the student changed. Full transcripts are not routinely required. Students must not upload confidential, personal, identifiable, unpublished, or restricted material without authorization and must respect copyright, licensing, consent, privacy, accessibility, and synthetic-media disclosure requirements.

Class activities may examine instructor-provided generated material when it offers a useful example of a communication or verification problem; students do not need personal access to an AI system. The final oral defense is student-led, and neither a tool nor its output can serve as a defense for an inaccurate or misleading submission.

Publication, Audience Consent, and Contingency

Course grading and public publication are separate decisions. Projects are reviewed privately first and are posted publicly only with separate permission. Students may request a byline, pseudonym, limited-access version, modification, or later removal. The instructor may delay or decline publication when mathematical reliability, accessibility, privacy, copyright, consent, or safety concerns remain unresolved.

Audience testing should collect only the information needed for revision. Students must obtain appropriate consent before recording or publishing names, images, voices, or quotations and should avoid work with minors unless the instructor has approved the procedure. An instructor-facilitated in-class testing route will be available when a student cannot recruit suitable testers.

Tool failure, website failure, or loss of access should not determine the grade. Students submit a static, exported, or recorded fallback when relevant. If enrollment is large, showcase timing may be shortened or supplemented by an asynchronous gallery; if the guest speaker is unavailable, the seminar becomes an instructor-led professional artifact clinic.

Communication and Feedback

Feedback will be provided through Canvas, class discussion, peer critique, mentoring meetings, and audience-testing activities. Assessment marks for individual assessed tasks will normally be communicated within two weeks of submission. Students who have questions about feedback should consult the instructor promptly, ideally within five working days of receiving it.

Resubmission and Revision Policy

Revision is built into the course. Students will receive formative feedback on project proposals, prototypes, and audience tests and are expected to revise before the final showcase. After a final assessment has been graded, resubmission is generally not permitted except under special circumstances and with prior approval from the instructor. Any approved resubmission must include an explanation of revisions.

Required Texts and Materials

There is no single required textbook. Students will use selected excerpts, course slides, examples, and project templates. Preparation is normally designed for approximately 20-30 minutes per lecture rather than completion of entire long readings. The following foundational readings are retained from the 2022 course:

- Ghys, E., “The Internet and the Popularization of Mathematics,” Proceedings of the ICM, Seoul, 2014.
- Howson, A. G. and Kahane, J.-P. (eds.), The Popularization of Mathematics, Vol. 5, Cambridge University Press, 1990.
- Rousseau, C., “The Role of Mathematicians in Popularization of Mathematics,” Proceedings of the ICM, Hyderabad, 2010, pp. 706–722.
- Stewart, I., “Mathematics, the Media, and the Public,” Proceedings of the ICM, Madrid, 2006, pp. 1631–1644.
- Ziegler, G. M., “Communicating Mathematics to Society at Large,” Proceedings of the ICM, Hyderabad, 2010, pp. 706–722.
- Selected guidance on responsible use of digital and generative tools, together with current public mathematics artifacts, will be supplied through Canvas.

Academic Integrity

Students must follow HKUST’s Academic Honor Code and academic integrity policy. Plagiarism includes presenting another person’s or an AI system’s words, images, code, or ideas as one’s own without acknowledgment. See the HKUST Academic Registry for guidance: HKUST policy