The Hong Kong University of Science and Technology (Guangzhou)

UCUG1903 Syllabus

Course title: Signals and Information Technology

Course code: UCUG1903

Credit: 3 credits

No pre-/co-requisites

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Time & Location: Friday 15:00-17:50, E1-134

Office Hours: Friday 14:00-14:45

Course Description

[Briefly describe the course content, key topics or themes, objectives, methods of instruction, e.g., lectures, discussions, projects].

This common core course introduces the basics of signals and information technology and their applications to daily-life consumer communication devices. Contents include the representation of signals in the time and frequency domains; digitization of information; coding for data compression and error protection; transmission of signals; five generations of cellular networks, multiple access technologies, and packet switching.

In this course, the blended learning approach will be adopted. The instructor will release the course materials and send the link through emails before each lecture. Students need to learn the materials and complete the simple quiz before attending the lecture. During the lecture, the instructor will further explain the concepts and theorems, provide examples, conduct discussions and hands-on activities, and demonstrate signal processing examples.

Students will do a group project to address state-of-the-art signals and information technology and present their views and findings.

It is expected that through studying these technologies and how they address the problems encountered in the information technology area, students will also grasp the skills in solving problems with engineering approach and spirit and appreciate how these technologies impact the society

Intended Learning Outcomes (ILOs)

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

1. Describe the key technological developments of signals and information technology

2. Identify the fundamental principles related to signals and information technology

3. Solve simple engineering problems related to signals and information technology, such as audio signal processing and modulation, using software tools
4. Create an interactive presentation on state-of-the-art signals and information technology, and to document analysis, evaluation, and/or imagination of state-of-the-art signals and information technology in a written report

5. Collaborate and communicate effectively in a team setting

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:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework	20%	Upon Announcement
Midterm	25%	Week-7
Final examination	35%	Final Week
Group Project	20%	Week-13

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Homework	CILO-1, CILO-2, CILO-3	For students to apply their knowledge of signals and information technology to analyze, formulate and solve simple engineering problems (CILO-1, CILO-2) using software tools (CILO-3).
Midterm	CILO-1, CILO-2	This task tests students' understanding of fundamental principles. It also tests students' abilities to apply their knowledge of signals and information technology to analyze, formulate and solve simple engineering problems (CILO-1, CILO-2).

Final examination	CILO-1, CILO-2	This task tests students' understanding of fundamental principles. It also tests students' abilities to apply their knowledge of signals and information technology to analyze, formulate and solve simple engineering problems (CILO-1, CILO-2).
Group Project	CILO-1, CILO-4, CILO-5	This task is for students to work together and apply their knowledge on signals and information technology to illustrate an up-to-date electronic and information technology (CILO-1, CILO-5), create an interactive presentation on state-of-the-art signals and information technology, and to document analysis, evaluation, and/or imagination of state-of-the-art signals and information technology in a written report (CILO-4).

Weekly Schedule and The Corresponding CILOs

Week	Topics	CILOs
1	Introduction to Signals and Systems Organize ideas coherently from sentence to text level in speaking and writing	CILO-1, CILO-2, CILO-4, CILO-5
2	Sound Signal, Frequency and Harmonics, Signals as Sum of Sine Waves	CILO-1, CILO-2, CILO-3
3	Spectrum - Representation of Signals in the Frequency, Systems as Filters of Signals	CILO-1, CILO-2, CILO-3
4	Benefits of Digitization, Bits and Bytes	CILO-1, CILO-2, CILO-3
5	Introduction to Analog to Digital Conversion, Quantization	CILO-1, CILO-2, CILO-3
6	Claude Shannon and Information Theory, Introduction to Source Coding	CILO-1, CILO-2, CILO-3
7	Midterm Huffman Code and Moving Picture Experts Group (MPEG)	CILO-1, CILO-2, CILO-3
8	Error Detection Codes, Error Correcting Code	CILO-1, CILO-2, CILO-3
9	Channel Capacity, Introduction to Wireless Communications	CILO-1, CILO-2, CILO-3
10	Cellular Network Basics Frequency Translation	CILO-1, CILO-2, CILO-3
11	Multiple Access Technologies	CILO-1, CILO-2, CILO-3
12	Introduction to Internet Protocol and Packet Switching	CILO-1, CILO-2, CILO-3, CILO-4, CILO-5
13	Project Presentation	CILO-1, CILO-2, CILO-3, CILO-4, CILO-5

Grading Rubrics

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

1. Project presentation

Element \ Score	3	2	1	0
Language and Visual Aid	The language is clear and correct. All the visual aids are clear and legible, and relevant to the content.	The language is clear and correct. Most of the visual aids are clear and legible, and relevant to the content.	The language is mostly clear and correct. Few of the visual aids are clear and legible, and relevant to the content.	The language is not clear and correct. All the visual aids are not clear and irrelevant to the content.
Structure and Organization	All the slides have good layout. The total number of slides is 10-15.	Most of the slides have good layout. Or the total number of slides is not 10-15.	Few of the slides have good layout. And the total number of slides is not 10-15.	The layout of the slides is poor. And the total number of slides is not 10-15.
Content	The content covers all the relevant techniques and background. The contents are presented in a logical order.	The content covers most of the relevant techniques and background. Most of the contents are presented in a logical order.	The content covers few of the relevant techniques and background. Few of the contents are presented in a logical order.	The content does not cover the relevant techniques and background. The contents are not presented in a logical order.
Oral Presentation	The project is clearly presented. The presenter engaged with the audience. The presenter spoke at an appropriate volume, with appropriate body language.	The presenter achieved any two of the following elements: The project is clearly presented. The presenter engaged with the audience. The presenter spoke at an appropriate volume, with appropriate body language	The presenter achieved any one of the following elements: The project is clearly presented. The presenter engaged with the audience. The presenter spoke at an appropriate volume, with appropriate body language	The project is not clearly presented. The presenter did not engage with the audience. The presenter did not speak at an appropriate volume, without appropriate body language.

2. Project report

Element \ Score	3	2	1	0
Language and Visual Aid	The language is clear and correct. All the visual aids are clear and legible, and relevant to the content.	The language is clear and correct. Most of the visual aids are clear and legible, and relevant to the content.	The language is mostly clear and correct. Few of the visual aids are clear and legible, and relevant to the content.	The language is not clear and correct. All the visual aids are not clear and irrelevant to the content.
Structure and organization	The report is well organized with the introduction, the main body, and the summary sections.	The introduction or the summary section is missing.	Both of the introduction and the summary sections are missing. Or, the main body section is missing.	The report only contains the introduction or the conclusion section.
Content	The content covers all the relevant techniques and background. The content are presented in a logical order.	The content covers most of the relevant techniques and background. Most of the content are presented in a logical order.	The content covers few of the relevant techniques and background. Few of the content are presented in a logical order.	The content does not cover the relevant techniques and background. The content are not presented in a logical order.
Citation Note: for AI-generated citation, the writer should follow the format below and append the screen shot of the question and AI-generated response to the question. 1. In-text citation: ([Citation number]) 2. Reference list: [Citation number] ChatGPT, response to author query. OpenAI [Online]. https://chatgpt.pro/ (accessed February 15, 2023)	The writing meticulously adheres to the Institute for Electrical and Electronics Engineers (IEEE) citation style, consistently and accurately citing all sources used in the text and references section. In-text citations follow the proper IEEE format, including author names, publication years, and page numbers when necessary. The references section is comprehensive and properly formatted, with all required elements, such as author names, publication dates, titles, and source information, presented in accordance with IEEE guidelines.	The writing consistently adheres to the Institute for Electrical and Electronics Engineers (IEEE) citation style, accurately citing sources used in the text and references section. In-text citations generally follow the proper IEEE format, including author names and publication years. The references section is comprehensive and properly formatted, with all required elements, such as author names, publication dates, titles, and source information, mostly presented in accordance with IEEE guidelines.	The writing partially adheres to the Institute for Electrical and Electronics Engineers (IEEE) citation style, with occasional errors or inconsistencies in the citation format. In-text citations may not consistently follow the proper IEEE format for author names, publication years, or page numbers. The references section may have some omissions or inaccuracies in the required elements, such as author names, publication dates, titles, or source information.	The writing does not adhere to the Institute for Electrical and Electronics Engineers (IEEE) citation style, with numerous errors or inconsistencies in the citation format. In-text citations do not follow the proper IEEE format for author names, publication years, or page numbers. The references section may be incomplete, inaccurately formatted, or missing required elements, such as author names, publication dates, titles, or source information.

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the

		ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

[State the course policy on the use of generative artificial intelligence tools to complete assessment tasks.]

In this course, students are allowed to use generative artificial intelligence (AI) to aid you in any manner. However, you must cite the AI generated contents with APA or IEEE citation.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas 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.]

Late submission is allowed. However, any late submission will receive a 50% deduction per day late.

Required Texts and Materials

[List required textbooks, readings, and any other materials]

Supplemental book:

"Engineering Our Digital Future", Pearson Prentice Hall, c2004

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct 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.]