

The Hong Kong University of Science and Technology

UG Course Syllabus

Computer Engineering Final Year Thesis in COMP

CPEG 4902

6 credits

Course Description

Each student taking the Research Option of the Computer Engineering program is required to complete an individual thesis before graduation. The student is expected to conduct a research on a topic related to Computer Engineering and/or its application. The thesis is conducted under the supervision of faculty members from the Department of Computer Science and Engineering. Credit load will be spread over the year. Instructor's approval is required for enrollment in the course. For CPEG students only.

Intended Learning Outcomes (ILOs)

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

1. Develop original solutions to computer science and engineering problems of significant complexity.
2. Utilize prior knowledge, independent research, published information, and original ideas in addressing problems and generating solutions.
3. Critically evaluate different research approaches, and justify the final choice of design through system development, simulation and/or analysis.
4. Use computational and/or mathematical tools to plan, design and validate an approach if needed.
5. Prepare and deliver a well-structured written analysis of the project, as well as an oral defense.
6. Establish relationships and implement practices with advisors and/or local/international researchers that will underpin a high level of performance and encourage continuous improvement.
7. Identify ethical issues that an engineer in the field of computer science may face in workplaces.

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:

1. All students are given an official grade of PP at the end of the Summer and Fall Terms respectively. The five components of the final letter grade have the following weighting from the advisor's perspective:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Project proposal report	5%	2026-09-11
Individual essay	5% (graded by communication tutors)	2026-10-16
Project progress report	20%	2027-02-12
Final project report	35%	2027-04-16
Oral presentation/thesis defense	30%	2027-04-24 to 2027-05-01
Monthly reports (Oct, Nov, Dec/Jan)	5%	2026-10-31, 2026-11-30, 2027-01-15
Total	100%	

Letter grade with A to F will be given. The advisor may give different letter grades in each of the five components to students within the same group.

The reader will focus on the product of the project. A different set of weights are used based on the reader's perspective:

Project proposal report	5%
Project progress report	15%
Final project report	35%
Oral presentation/thesis defense	40%
Poster session	5%
Total	100%

The reader gives one letter grade for each of the five components for each project.

2. Grade Determination

- Advisors and readers grade the five components independently.
- Advisors grade the five components for each of the students in group projects. Thus, it is possible that members of the group receive different letter grades for each component.
- Readers grade the five components for the project only. Thus, all members receive the same letter grade for each component.
- The final letter grade for each student is computed by combining the letter grades given by the advisor and the reader using a advisor-reader weighting of 60:40.
- Readers may interact with advisors during the year to gain more insights on the projects.

3. The components

- For FYT:
 - The grading scheme for the proposal report is (both advisors & readers):
 - Thesis objective formulation, methodology to be followed, background - 60%
 - Clarity and presentation of the report (organization, use of English) - 30%
 - Planning of future work - 10%
 - The grading scheme for the individual essay is (advisors/communication tutors only):
 - Clarity - 30%
 - Content - 30%
 - Relevance - 40%
 - The grading scheme for the progress report is (both advisors & readers):
 - Work completed - 60%
 - Clarity and presentation of the report (organization, use of English) - 30%

- Use of research approaches related to computer science and engineering discipline (literature review, system/algorithm design, mathematical analysis, modeling, simulation, system prototyping are included here) - 10%
- The grading scheme for the final report is (both advisors & readers):
 - Results obtained - 60%
 - Clarity and presentation of the report (organization, use of English) - 30%
 - Use of research approaches related to computer science and engineering discipline (optimization, analysis, simulation, result verification are included here) - 10%
- The grading scheme for the thesis defense is (both advisors & readers):
 - Result presentation - 40%
 - Delivery: Oral delivery, contact with audience, slides, timing - 40%
 - Quality of answers - 20%
- The grading scheme for the monthly reports is (advisors only):
 - Each monthly report - 33.33%
- The grading scheme for the poster session is (readers only):
 - Clarity and presentation of the poster - 50%
 - Information conveyed - 50%

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Project proposal report	ILO1, ILO2	This task assesses students' ability to explain and apply computer science and engineering concepts (ILO1), evaluate gaps in existing works (ILO2), and propose an original solution in addressing the target problem.
Individual essay	ILO7	This task assesses students' understanding of potential ethical considerations and challenges when building systems in workplaces (ILO7)
Project progress report	ILO1, ILO2, ILO3, ILO4, ILO6	This task assesses students' ability to explain and apply computer science and engineering concepts (ILO1), evaluate their implications (ILO2), critically analyze different design choices (ILO3), synthesize a well-argued solution (ILO4), and continuously improve the project through collaboration with advisors and/or other researchers (ILO6).

Final project report	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6	This task assesses students' ability to explain and apply computer science and engineering concepts (ILO1), evaluate their implications (ILO2), critically analyze different design choices (ILO3), synthesize a well-argued solution (ILO4), deliver a well-structured written presentation (ILO5), and continuously improve the project through collaboration with advisors and/or other researchers (ILO6).
Oral presentation	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6	This task assesses students' ability to explain and apply computer science and engineering concepts (ILO1), evaluate their implications (ILO2), critically analyze different design choices (ILO3), synthesize a well-argued solution (ILO4), deliver a well-structured written presentation (ILO5), and continuously improve the project through collaboration with advisors and/or other researchers (ILO6).
Monthly reports	ILO6	Establish relationship and collaborative practices with team members and advisors to advance the project (ILO6).

Grading Rubrics

Program Outcome	Component	Percentage	Exemplary (A- to A+)	Competent (B- to B+)	Needs Work (C- to C+)	Unsatisfactory (D, F)
Individual Ethics Essay						
	CONTENT - Statement of Purpose System and goal relevant to ethics are defined. Identify the technical area of your (two) issues: dataset, software, gaming, database, vision and graphics and AI. Identify the ethical area: transparency, bias, sustainability, privacy, security, confidentiality. Key findings are stated. Two problems are identified. Two ethical solutions are given. Is there transparency in system design, data and process? Is there indication of integrity, fairness and honesty? Is the work free from bias?	40%	System goals relevant to ethical considerations are clear. Statement of Problem is well defined. Technical and ethical areas are clearly identified. Findings are discussed coherently. Problems identified are addressed with reference to integrity, transparency and bias. Key takeaways are clear.	System goals are implied and not elaborated on adequately. Either technical or ethical solutions are identified (only one) or implied. Findings are not discussed sufficiently. Problems are not discussed with reference to integrity, transparency and bias. Key takeaways are unclear.	System goals are not defined. Technical or ethical solutions are implied and not stated. Findings are not discussed coherently. Problems are not clearly stated. Key takeaways are unclear.	System goals, ethical issues and main points are not clear. Findings are not discussed. Problems are not stated. Intent is unclear.
	RELEVANCE - Addressing the Ethical Issues Analyze the ethical issues which arise from your case? Address and elaborate on the issues. What ethical rules (one or two) were breached? The issues and solutions are interpreted against a benchmark like HKIE, ACM or GDPR. Overall opinion is provided.	30%	The solutions are specifically interpreted against benchmark like HKIE, GDPR and ACM. The solutions are clearly explained in relation to the system.	The solutions are generally interpreted against benchmark like HKIE, GDPR and ACM. The solutions are generally connected to the system.	HKIE, GDPR or ACM are mentioned without connecting them to solutions. The solution is not connected to the system.	HKIE, GDPR and ACM are not mentioned or are mentioned but are not relevant to the either system or ethical solutions.
	CLARITY - Logic and Cohesion Background is adequately provided (what is your work about?). Statement of purpose is clear. Logical and coherent with a good balance of description and analysis of system and ethical issues. Critical thinking based on evidence: analysis, synthesis, conclusions. Analytical essay format is used and supported with evidence.	30%	The argument is logical, coherent with a good balance of system description relevant to the ethical issues raised. Critical thinking based on evidence, analysis, synthesis and conclusions are clear. Paragraphs are well developed. The analytical essay is written based on SPSR - Situation, Problem, Solution and Response.	The argument is skewed either towards system description or ethical issues. There is evidence of two critical thinking skills - analysis, synthesis or conclusions. Paragraphs are sufficiently developed. A few parts are Analytical Essay SPSR format is evident.	System description and ethical issues are vague or not covered. There is some evidence of critical thinking skills. Paragraphs are not developed. Arguments are not based on analytical essay format.	Incoherent and lacking in structure. Opinions are personal and not based on evidence. Lack of overall clarity.

Program Outcome	Component	Percentage	Exemplary (A- to A+)	Competent (B- to B+)	Needs Work (C- to C+)	Unsatisfactory (D, F)
Proposal Report						
	Project objective formulation, methodology to be followed, background	60%	The objectives are well defined and prioritized. All relevant information and constraints are obtained and accurately analyzed. Decision and design recommendation are well supported by the information.	All major objectives are identified. Sufficient information is obtained. Appropriate analyses are selected. Decision and design recommendation are reasonable and mostly supported by the information.	Most major objectives are identified but one or two minor ones are missing or priorities are not established. Most constraints are identified; some are not adequately addressed or accurately analyzed. Decision and design recommendation is reasonable.	Many major objectives are not identified. Information is collected but without any analysis. Only one solution is considered or other solutions were ignored or incompletely analyzed. Many constraints and criteria were ignored.
	Clarity and presentation of the report (organization, use of English)	30%	Report is well organized and clearly written. The underlying logic is clearly articulated and easy to follow. Words are chosen that precisely express the intended meaning and support reader comprehension. Diagrams or analyses enhance and clarify presentation of ideas. Sentences are grammatical and free from spelling errors.	Report is organized and clearly written for the most part. In some areas the logic or flow of ideas is difficult to follow. Words are well chosen with some minor exceptions. Diagrams are consistent with the text. Sentences are mostly grammatical and only a few spelling errors are present but they do not hinder the reader.	Report is organized via topic/flow, but in some areas it is difficult to follow the flow of ideas. Words can be further improved. Some diagrams are not well explained. Grammar errors that impede the flow of communication.	Report lacks an overall organization. Reader has to make considerable effort to understand the underlying logic and flow of ideas. Diagrams are absent or inconsistent with the text. Grammatical and spelling errors make it difficult for the reader to interpret the text in places.
	Planning of future work	10%	Complete and well-analyzed task list. Detailed well-around plan of future work. Reasonable timing and labor allocation.	Well-defined task list. Good plan of future work. Practical timing and labor allocation.	A possibly incomplete task list without priority. Plan of future work but not well justified. Time and labor allocation is not well thought.	No clear task list. Future work is not well considered. No time and labor allocation.

Program Outcome	Component	Percentage	Exemplary (A- to A+)	Competent (B- to B+)	Needs Work (C- to C+)	Unsatisfactory (D, F)
Progress Report						
	Work completed	60%	Progress is beyond expectations with respect to plan. Highly detailed discussions on milestones completed.	Progress is highly satisfactory with respect to plan. Detailed discussions on milestones completed.	Progress is mostly satisfactory with respect to plan. Some discussions on milestones completed.	Progress is not satisfactory with respect to plan. No discussions on milestones completed.
	Clarity and presentation of the report (organization, use of English)	30%	Report is well organized and clearly written. The underlying logic is clearly articulated and easy to follow. Words are chosen that precisely express the intended meaning and support reader comprehension. Diagrams or analyses enhance and clarify presentation of ideas. Sentences are grammatical and free from spelling errors.	Report is organized and clearly written for the most part. In some areas the logic or flow of ideas is difficult to follow. Words are well chosen with some minor exceptions. Diagrams are consistent with the text. Sentences are mostly grammatical and only a few spelling errors are present but they do not hinder the reader.	Report is organized via topic/flow, but in some areas it is difficult to follow the flow of ideas. Words can be further improved. Some diagrams are not well explained. Grammar errors that impede the flow of communication.	Report lacks an overall organization. Reader has to make considerable effort to understand the underlying logic and flow of ideas. Diagrams are absent or inconsistent with the text. Grammatical and spelling errors make it difficult for the reader to interpret the text in places.
	Use of software engineering techniques (concepts of initial system development, system requirement specification, system analysis specification & user interface specification are included here)	10%	Employ appropriate analytical tools and/or software engineering techniques. Clearly demonstrates mastery of several areas of the curriculum.	Employ appropriate analytical tools and/or software engineering techniques acquired in his course of study to the project at hand.	Employ some analytical tools and/or software engineering techniques acquired.	Does not make use of analytical tools and/or software engineering techniques relevant to the project

Program Outcome	Component	Percentage	Exemplary (A- to A+)	Competent (B- to B+)	Needs Work (C- to C+)	Unsatisfactory (D, F)
Final Report						
	Results obtained	60%	Perform competently and in addition notice improvements that can be made to the design spec. Deliver code of exceptional quality. Plan and execute thorough list of test cases.	Develop code that follows the design spec. Develop structured code. Plan and execute list of test cases with expected result specified.	Develop code that follows the design spec, but can be further improved. Plan and execute some test cases, but not covering all possible scenarios.	Fail to develop code following the design spec and/or without using structure programming techniques. Perform minimal testing of own code, concentrating exclusively on the simplest, most obvious cases.
	Clarity and presentation of the report (organization, use of English)	30%	Report is well organized and clearly written. The underlying logic is clearly articulated and easy to follow. Words are chosen that precisely express the intended meaning and support reader comprehension. Diagrams or analyses enhance and clarify presentation of ideas. Sentences are grammatical and free from spelling errors.	Report is organized and clearly written for the most part. In some areas the logic or flow of ideas is difficult to follow. Words are well chosen with some minor exceptions. Diagrams are consistent with the text. Sentences are mostly grammatical and only a few spelling errors are present but they do not hinder the reader.	Report is organized via topic/flow, but in some areas it is difficult to follow the flow of ideas. Words can be further improved. Some diagrams are not well explained. Grammar errors that impede the flow of communication.	Report lacks an overall organization. Reader has to make considerable effort to understand the underlying logic and flow of ideas. Diagrams are absent or inconsistent with the text. Grammatical and spelling errors make it difficult for the reader to interpret the text in places.
	Use of software engineering techniques (concepts of system design specification and implementation are included here)	10%	Employ appropriate analytical tools and/or software engineering techniques. Clearly demonstrates mastery of several areas of the curriculum and is able to propose innovative solutions to the technical challenges posed by the project.	Employ appropriate analytical tools and/or software engineering techniques acquired in his course of study to the project at hand. Clearly demonstrate mastery of many areas of the curriculum and is able to successfully complete the proposed project.	Employ some analytical tools and/or software engineering techniques acquired. Make progress towards addressing the technical challenges of the project. Complete most of the major tasks in the proposed project.	Does not make use of analytical tools and/or software engineering techniques relevant to the project. Does not demonstrate requisite command of the material covered in the curriculum. Unable to finish the proposed project.

Program Outcome	Component	Percentage	Exemplary (A- to A+)	Competent (B- to B+)	Needs Work (C- to C+)	Unsatisfactory (D, F)
Oral Presentation						
	Project demonstration	40%	Present a fully-functioning working product with several original/inventive elements. Show strong effort was made in breaking new ground and building excitement about the application. The demonstration techniques are imaginative and effective in conveying ideas to the audience.	Present a working product with support to all desired functions. Offer some new information or approach about the application. The demonstration techniques are effective in conveying main ideas.	Present a working product but some desired functions are not supported or malfunctioned. Simply shows how the application works. The demonstration only conveys main ideas.	The product is incomplete or does not work. Show little effort in building the application. The demonstration failed to capture the interest of the audience and/or is confusing in what was communicated.
	Delivery: Oral delivery, contact with audience, slides, timing	40%	Slides cover complete, accurate description of important outcomes. Effective use of charts, graphs, figures etc. Use of fluent English and confident. Hold attention by direct eye contact and nature hand gestures. Excellent timing and smooth transition among different parts.	Slides cover accurate description of most of important outcomes. Use of charts, graphs, figures etc. Fair use of English. Hold attention by consistent use of direct eye contact. Presentation runs with desired pace and finishes within allocated time.	Slides cover some of the outcomes. Limited use of charts, graphs, figures etc. Use of English with noticeable errors. A few eye contacts only. Presentation pace is not well planned but finished within allocated time.	Information is arranged in confused and unstructured way. Student lacks of confidence. Poor use of English. Does not attempt to look at audience at all. Read notes or looks at computer screen only. Presentation is too short or too long for the allocated time.
	Quality of answers	20%	Student has presented full knowledge of both problem and solution. Answers to questions are strengthened by rationalization and explanation.	Student has competent knowledge and is at ease with information. Can answer questions.	Student is uncomfortable with information. Seems novice and can answer basic questions only.	Student has no or very less knowledge of both problem and solution. Cannot answer questions.

Final Grade Descriptors:

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

The course in general is open to the use of generative AI but the actual policy for individual groups will be decided by the advisors.

Communication and Feedback

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

Resubmission Policy

Not applicable.

Required Texts and Materials

N/A

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.

Additional Resources

N/A