Subject Description Form

Subject Code	BRE4661
Subject Title	Integrated Capstone Project
Credit Value	6
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: CMI366 (Analytical Skills and Methods) Exclusion: Any other equivalent capstone project, e.g. CMI466 (Capstone Project)
Objectives	The aim of the subject is to provide students with the opportunity of demonstrating research competence by providing them with a vehicle through which they can reveal a full understanding and evaluation of an issue or a topic that they choose to investigate. The Project is in the form of a final year Dissertation, and the issue or the topic should be based on the chosen programme major (i.e. Building Engineering and Management), together with the Artificial Intelligence and Data Analytics (AIDA) scheme as their Secondary Major, relevant to the construction industry with particular concerns to Hong Kong and its neighboring environments. The specific objectives of this subject are to: • Provide a student with the opportunity to apply and integrate the knowledge of artificial intelligence and data analytics (AIDA) to his/her chosen discipline of Building Engineering and Management; • Develop the capabilities of a student in analyzing and solving complex and possibly real-life problems using AIDA knowledge and skills; and • Train students with skills in systematic development and documentation of a significant piece of work.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) display a culminating set of personal, academic and professional experiences/learning; b) synthesize, integrate and/or apply previous knowledge instead of solely acquiring new knowledge/skills; c) apply general education principles; d) engage in an interdisciplinary inquiry of at least two or more disciplines; e) produce a research proposal related to a topic in the field of construction and real estate; f) apply an appropriate research methodology to the chosen topic; g) conduct a critical and comprehensive literature review; h) analyse data and evaluate findings; i) communicate their ideas in a clear, concise and precise manner; j) produce a dissertation that is based on their research and written in good English. k) critically evaluate and appropriately integrate GenAI tools to assist in problem-solving, making and justifying decisions that cannot be outsourced to GenAI (e.g., identifying bias, hallucinations, and contextual trade-offs).

Subject Synopsis/ Indicative Syllabus

For those students choosing the Building Engineering and Management (BEM) programme as their Major and also opting for AIDA scheme as their Secondary Major, they are expected to identify a project topic in the field of Building Engineering and Management with the identified problems to be solved using AIDA knowledge and skills under the supervision of a supervisor with research expertise in artificial intelligence and data analytics.

The topic should be engineering-oriented or engineering related areas in construction. The Dissertations are grouped into several study areas within the research themes of the Department such as construction technology and science, production engineering, production and contract management, engineering economics, construction quality in engineering works, application of information technology in the building industry, engineering materials, etc. Occasionally, if a student proposes a topic which is not within the context of engineering orientation, consideration and prior approval need to be sought from the BEM Programme Management Team.

Students need to demonstrate their knowledge in both their chosen discipline (BEM) and AIDA in the project, receiving advice from the allocated supervisors. The project should represent requisite efforts in analyzing and interpreting the data/information obtained, using the principles and techniques learned from various related subjects. Students are also expected to demonstrate significant analytical and, preferably, research ability in the chosen application domain of AIDA.

Teaching/Learning Methodology

Academic leadership is provided by the Capstone Project Committee comprising Capstone Project Co-ordinators and Scheme Chair. The Committee is assisted by the supervisors who are CMI academic staff with research experience.

In the case of final year Dissertation, each student will work under the guidance of a supervisor and, if necessary, a second supervisor may be appointed to assist in project supervision. The project supervision is timetabled for one hour per two weeks over the whole dissertation study period, but students are expected to devote about a day per week of their own time to carrying out study and research work. Students are encouraged to formulate a testable hypothesis with theoretical model or justifications; carry out an empirical test on the hypothesis; and draw inference(s) on research and practical implications from the findings.

Students will be instructed and required to use free GenAI tools (e.g., on the PolyU GenAI Platform) to ensure equity and accessibility for all students. In addition, students are required to keep digital traces, such as a log sheet of the prompts used and the outputs generated by GenAI, making their learning process visible to the assessor.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)										
		a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
1. Final Proposal	10%	√	√			√	√	√				
2. Progress Report	10%		√				√	√	√			
3. Reflective Journal	10%	√	√									
4. Oral Defense & Competency	20%									√	√	√

Verification												
5. Dissertation	50%			√		√		√	√	√	√	√
Total	100%											

***Students must pass all components to pass the subject.**

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment of each of the four tasks (Final Proposal, Progress Report, Reflective Journal and Dissertation) will be made based on "Assessment Rubrics" that will be adopted and approved by the Dissertation Committee. The Assessment Rubrics will be made available for reference by both students and supervisors on the Dissertation Guide webpages. The main criteria are underlined as listed below.

Final Proposal

Before starting detailed research, students must get their Final Proposal approved by their supervisor. The Final Proposal must include seven core components: Problem Statement, Literature Review, Aim and Objectives, Research Methodology, Data Analysis, References, and AI Use Plan.

Progress Report

During the progress of the research, the student and Supervisor will meet for consultation. It is the responsibility of students to arrange meetings with their supervisors in order that they may report and discuss their progress. It is expected that students will devote sufficient time to the Dissertation, bearing in mind the requirements outlined in the subject syllabus. Discussions with Supervisors are essential to explore the challenges faced by the student as they learn about the research topic through the research process. Thus, students are required to produce evidence of their work at their meetings with their supervisors, so that the problems encountered can be shared and solved together.

Students should provide GenAI use logs if GenAI tools are used for the work. This report acts as a checkpoint for drafts, outlines, and GenAI logs to capture how students think, create, and develop work overtime, rather than just grading a final submission.

Reflective Journal

A reflective journal is a core component for students to critically analyze and articulate their ideas, personal thoughts, perspectives, and experiences gained throughout the capstone project lifecycle. Moving beyond a passive summary of events, this writing must document the real-world challenges, technical bottlenecks, and problems encountered during the research process, highlighting the independent strategies devised to overcome them. Through structured self-reflection, it directly enhances deep and critical thinking skills by requiring students to bridge theoretical knowledge with real-world industry issues, demonstrating visible evidence of their developmental learning and professional growth.

Oral Defense & Competency Verification:

Students are required to give a 20-minute interactive oral defense session to verbally defend their research views, justify their methodological choices, and field unpredictable questions from supervisors. This serves as a mechanism to check the student's own understanding and competency as well as safeguards assessment security.

Assessment Proforma for "Final Proposal, Progress Report, Reflective Journal and Oral Defense"

Assessment	Criteria	Weighting
Final Proposal	Problem Statement (2%), Literature review (2%), Aim and objectives (2%), Research methodology (2%), AI use plan (2%)	10%
Progress Report	Planning (3%), Progress completion (4%), GenAI use logs (2%)	10%
Reflective Journal	Demonstration of learning process (3%), Critical self-evaluation (2%), Personal growth (2%), Contextual judgement & Critical evaluation of GenAI (3%)	10%
Oral Defense & Competency Verification	Communicating ideas in a clear, concise and precise manner (10%), Defense of views (10%)	20%
	Total	50%

Dissertation

Subject to specific exceptions approved by the Supervisor to suit unique research topics, students are expected to actively mirror authentic professional workflows within the modern building and real estate industry, where GenAI is rapidly becoming standard practice. Rather than treating AI as a mere text-generator, students are encouraged to demonstrate innovative and disruptive applications of GenAI to unlock higher-order learning and technical insights that would be difficult or impossible to achieve through traditional means.

Assessment Proforma for "Dissertation"

Assessment	Criteria	Weighting
Presentation	Grammar and structure development (2%), Aesthetics and use of illustrative materials (3%)	5%
Introduction	Appropriateness of the stated aim and objectives (3%), Appropriateness preview the organization of the thesis (2%)	5%
Literature Review	Relevance to the research question (3%), Depth and breadth of the evaluation of the materials (5%), Citations and references (2%)	10%
Research Methodology	Appropriateness and comprehensiveness of the research design (5%), Description of the research method (5%)	10%
Data Collection	Relevance to research question(s) and hypothesis (3%), Accuracy and Adequacy (5%),	10%

	and Analysis	Logicality of interpretation (2%)	
	Findings and Conclusions	Validity and logicality (2%), Originality & Innovativeness (5%), Degree of critique (3%)	10%
		Total	50%

Academic Integrity

Students shall acknowledge PolyU's stance and follow the Academic Integrity policy: https://www.polyu.edu.hk/cus/staff/academic-integrity/

Student Study Effort Required	Class contact:	
	▪ Guided study	10 Hrs.
	Other student study effort:	
	▪ Independent study	260 Hrs.
	Total student study effort	270 Hrs.

Reading List and References

Essential:

CMI466 Dissertation Guide

Recommendation:

Eager, B. (2024). AI-powered scholar: A beginner's guide to Artificial Intelligence for academic writing & research. Routledge.

Ewing, Reid H., and Park, Keunhyun (2020) Basic quantitative research methods for urban planners, New York, NY : Routledge.

Fellows R. and Liu A. (2015) Research Methods for Construction, New York: John Wiley & Sons, Incorporated.

Haber, E., Jemielniak, D., Kurasinski, A., & Przegalinska, A. (2025). Using AI in academic writing and research. Springer Nature Switzerland.

Holt G. (1998) A Guide to Successful Dissertation Study for Students of the Built Environment, 2nd edition. The Built Environment Research Unit, University of Wolverhampton.

Knight, A. and Ruddock, L. Ed. (2008) Advanced Research Methods in the Built Environment. Chichester: Wiley-Blackwell.

Lizieri C. (1995) Comment: Relevant Research and Quality Research: the Researcher's Role in the Property Market. Journal of Property Research, 12, 163-66.

Naoum S.G. (2012) Dissertation Research and Writing for Construction Students, Butterworth-Heinemann.