THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF BUILDING & REAL ESTATE
建築及房地產學系
INTERNATIONAL • COLLABORATIVE • CONSTRUCTION

Programme Requirement Document

Master of Science in Intelligent Construction (Programme Code: 32114)

For Student Intake 2025-26

September 2025

This Programme Requirement Document is subject to review and change, which the Department of Building and Real Estate (BRE) may decide to make from time to time. Students will be informed of the changes as and when appropriate.

Table of Contents

		Page
1.	Programme Overview	1
2.	Programme Rationale	1
3.	Programme Aims and Objectives	1
4.	Programme's Intended Learning Outcomes against Institutional Learning Outcomes	2
5.	Awards	3
6.	Professional Recognition	3
7.	Entrance Requirements	3
8.	Programme Structure	3
9.	Programme Management	9
10.	Assessment of Taught Subjects	9
11.	Dissertation	9
12.	Grading	11
13.	Retaking of Subjects	12
14.	Appeal against Assessment Results	12
15.	Progression and De-registration	12
16.	Academic Probation	13
17.	Grade Point Average	13
18.	Eligibility for Award	14
19.	Guidelines for Award Classifications	15
20.	Subject Registration and Withdrawal	15
21.	Credit Transfer	16
22.	Subject Exemption	17
23.	Zero Subject Enrolment	17
24.	Deferment of Study	17
25.	Withdrawal of Study	17
26.	Academic Integrity and Misconduct	18
27.	Prevention of Bribery Ordinance	18
28.	Subject Description Form	19
	- Compulsory Subjects:	
	BRE511 Information Management for Construction and Real Estate	20
	BRE534 Integrated Project in Intelligent Construction	23
	BRE535 Advanced Visualization and Interactive Technologies for Construction	25
	BRE536 Automation and Robotics in Construction	28
	BRE537 Machine Learning and Data Mining for Construction	31

BRE538 3D Printing in Construction: Principles and Applications 34
BRE586 Construction Information Technology 38
BRE587 Research Methods for Construction and Real Estate 40
BRE5751 Strategic Management 43
EEE5T03 Engineering Ethics and Academic Integrity 46
- Recommended Elective Subject:
BRE506 Principles of Project Management 49

Annexes
Annex 1 Dissertation Handbook (For BRE591 Dissertation) 53
Annex 2 Guidance Notes on Avoiding Plagiarism, on Bibliographic Referencing and on Photocopying of Copyright Materials 62

1. Programme Overview

This **MSc in Intelligent Construction** programme is a mixed-mode taught postgraduate programme designed to address the "Construction 2.0 - Time to Change", an initiative developed and promoted by the Hong Kong SAR Government, and the global demand in digitalisation in the construction industry. The programme will focus on equipping students with state-of-the-art Intelligent Construction Technologies (ICT) along with capabilities of executing construction engineering managerial skills through the pioneering ICT approaches in both theoretical and applied aspects. The programme is hosted by the Department of Building and Real Estate (BRE) of The Hong Kong Polytechnic University starting from the first intake cohort of 2023/24.

2. Programme Rationale

The construction industry plays a crucial role in the development of economic growth. As the current trend of digital shift in the built environment sector, particularly in the construction sector, has continued to grow, construction professionals require competent construction related IT skills to perform their professional services effectively and efficiently. To address the significant volume of predicted construction activities adopting innovation and advanced technologies, the Hong Kong SAR Government is taking the initiative to be a leading agent for the change. This is presented in "Construction 2.0 - Time to Change" – an expression of the construction industry's changes required across three key pillars: Innovation, Professionalism and Revitalisation.

Other additional initiatives are also put forward to ensure the construction industry is collectively allocating its resources to bring a resounding positive impact. These initiatives include science and technologies in BIM, IoT, Robotics, Augmented Reality/Virtual Reality, Electronic Sensing Technology, Advanced Computing Technology, and Machine Learning. Accordingly, Intelligent Construction Technologies (ICT) are a combination of the above-mentioned modern science and innovative construction technologies. ICT has been designed to save costs, reduce delivery time and improve the quality and safety of construction projects throughout the entire life cycle from planning, design, construction, operation, maintenance, rehabilitation and demolition.

Our programme philosophy is to prepare the graduates with strong background capable to coping with the emerging issues in the construction industry and how the ICT tools can be leveraged to tackle real-world complex problems in construction. It is expected that the programme would enhance the digital knowledge and capability of construction professionals and promote wider adoption of ICT in the construction industry, which echoes the Hong Kong SAR Government's initiative of Construction 2.0 and intelligent digitalisation of public works projects to benefit the construction industry at large in Hong Kong.

3. Programme Aims and Objectives

The programme aims to train up construction related students and professionals with strong digital construction related skills supported by ICT tools to perform their professional services in construction projects more intelligently. The core objectives of the programme are:

(i) To equip students with state-of-the-art ICT and digital construction technical skills required for construction projects, such as BIM, Robotics, 3D Printing, Visualization and Interactive Technologies, and Machine Learning.

(ii) To integrate the necessary knowledge and a range of analytical tools, digital skills, and transferable skills for the needs of construction professionals.

(iii) To develop students with skills of construction engineering management through pioneering digital approaches in both theoretical and applied aspects.

(iv) To cultivate critical thinking and research spirit in decision-making and problem-solving in the context of managing construction projects using digital approaches.

4. Programme's Intended Learning Outcomes against Institutional Learning Outcomes

Upon successful completion of the programme, students are expected to be able to achieve the following **Programme's Intended Learning Outcomes** which are in line with the **PolyU's Graduate Attributes and Institutional Learning Outcomes** (ILOs).

Programme's intended learning outcomes	**Mapping**	**PolyU's graduate attributes and institutional learning outcomes (ILOs)**
(a) Engage in continual professional development, reflect on their goals and purposes, refine their learning approaches, adapt to unfamiliar learning situations, and persevere through setbacks.	➔	*Adaptable and resilient lifelong learners*: Engage in continual professional development, reflect on their goals and purposes, refine their learning approaches, adapt to unfamiliar learning situations, and persevere through setbacks.
(b) Be able to critically evaluate complex information and arguments, make sound judgement in the absence of complete data, identify and analyse problems in complex situations and formulate creative strategic solutions. Invoke and make effective use of digital design thinking, methods and perspectives to generate innovative solutions to issues associated with construction projects.	➔	*Critical thinkers and creative problem solvers*: Be able to critically evaluate complex information and arguments, make sound judgement in the absence of complete data, identify and analyse problems in complex situations and formulate creative strategic solutions.
(c) Be able to communicate effectively with a broad range of audiences, and foster effective and harmonious collaboration in an intercultural and/or interdisciplinary team.	➔	*Effective communicators and collaborators*: Be able to communicate effectively with a broad range of audiences, and foster effective and harmonious collaboration in an intercultural and/or interdisciplinary team.
(d) Be able to critically apply advanced digital-approach knowledge and scholastic skills in a broad range of professional contexts to the management of construction projects, make critical use of changing and emerging digital technologies for work, and deal with complex interdisciplinary issues in building and construction industry.	➔	*Future-ready professionals who possess technical acumen*: Be able to critically apply advanced discipline knowledge and scholastic skills in a broad range of professional contexts, make critical use of changing and emerging technologies for work, and deal with complex interdisciplinary issues.
(e) Demonstrate a critical awareness of current issues in local, national and global contexts, be able to deal with complex issues and make responsible decisions, and lead with integrity and	➔	*Socially responsible leaders with a strong sense of national pride and a global outlook*: Demonstrate a critical awareness of current issues in local, national and

pride for the benefit of society and a sustainable future.		global contexts, be able to deal with complex issues and make responsible decisions, and lead with integrity and pride for the benefit of society and a sustainable future.

5. Awards

Master of Science (MSc) in Intelligent Construction (智能建造理學碩士) is awarded to those students who have successfully completed the credit requirements of the programme for graduation. Under exceptional circumstances as detailed under Section 18.2, students will be awarded the exit award of Postgraduate Diploma in lieu of Master of Science Degree.

6. Professional Recognition

Professional recognition of the programme will be sought with relevant professional bodies including but not limited to the Chartered Institute of Building (CIOB), Royal Institution of Chartered Surveyors (RICS), Hong Kong Institute of Construction Managers (HKICM) and Hong Kong Institute of Surveyors (HKIS), etc.

7. Entrance Requirements

(i) A bachelor's degree in the discipline of architecture, building, building services engineering, building sciences and engineering, building surveying, civil engineering, construction management, quantity surveying, project management, information technology or other related disciplines from recognised institutions.

(ii) Equivalent corporate membership of relevant professional institutions may also be considered for exceptional admissions of non-bachelor's degree applicants who possess related working experience in the construction industry.

(iii) If the bachelor's degree or equivalent qualifications of an applicant is awarded by an institution where the medium of instruction is not English, s/he must provide one of the following minimum English Language requirements for admission purpose: (1) A Test of English as a Foreign Language (TOEFL) score of 80 for the internet-based test or 550 for the paper-based test; or (2) An overall band score of at least 6.0 in the International English Language Testing System (IELTS).

8. Programme Structure

8.1 Mode and Duration of Study

Both full-time and part-time modes of study are offered to students to suit their individual needs.

(i) Duration for Full-Time Mode of Study: 1 year
(ii) Duration for Part-Time Mode of Study: 2 years

8.2 Dissertation and Non-dissertation Routes

Credit Requirement: 31 credits

(i) Dissertation route: BRE591 (Dissertation) (9 credits) that is relevant to intelligent construction PLUS 7 Compulsory Subjects (3 credits each) including the dissertation pre-

requisite / co-requisite subject BRE587 (Research Methods for Construction and Real Estate), and a 1-credit bearing subject on Academic Integrity and Ethics (see section 8.3).

(ii) Non-dissertation route: 9 Compulsory Subjects (3 credits each) including the Dissertation Replacement Subject BRE534 (Integrated Project in Intelligent Construction) PLUS an elective subject (3 credits) (Recommended Elective: BRE506 (Principles of Project Management)), and a 1-credit bearing subject on Academic Integrity and Ethics (see section 8.3).

8.3 University's Academic Integrity and Ethics (AIE) Requirement

The AIE requirement is imposed university-wide on all Taught Postgraduate Programmes with effect from 2024/25 intake cohort. AIE subjects are 1-credit bearing. No credit fee will be charged for the AIE subject. AIE subjects are assessed on a "Pass/Fail" basis which will not be included in GPA calculation. Attainment of a "Pass" in an AIE subject is a graduation requirement.

"EEE5T03 Engineering Ethics and Academic Integrity" offered by the Department of Electrical and Electronic Engineering is the AIE subject selected for the programme. The class contact hours of the AIE subject in a semester is 13 hours. The AIE subject can be offered in either semester 1 or semester 2 for students of a particular programme or mode, and be scheduled at weekday daytime, weekday evening or weekend, as determined appropriate by the subject offering Department.

Students should refer to the subject description form of the AIE subject to find out the specific subject-passing requirements.

8.4 University's National Education Requirement

With effect from 2022/23 intake cohort, students of Taught Postgraduate programmes are required to take a non-credit bearing 3-hour e-learning module on "Understanding China and the Hong Kong Special Administration Region, P.R.C." in English in their first year of studies on Blackboard (http://learn.polyu.edu.hk). After completion of the online module and self-study of the 20 lecture notes, students may take the assessment (10 multiple-choice questions) which allows for multiple attempts. Attainment of a "Pass" is a graduation requirement.

For more details, please visit Office of Undergraduate Studies' website at https://www.polyu.edu.hk/ous/nationaleducation/en/.

8.5 Medium of Instruction

All subjects are taught and delivered in English.

8.6 Curriculum Map

Semester	Subjects	Dissertation Route	Non-dissertation Route	No. of credits	Co*/Pre^ - requisite	Exclusion	Study Effort Hours	Assessment Components		Subject-offering Dept	Programme Learning Outcomes				
		Compulsory	Compulsory					Coursework	Examination		a	b	c	d	e
1	BRE511 (Information Management for Construction and Real Estate)	✓	✓	3	Nil	Nil	120	100%	------	BRE	✓	✓	✓	✓	✓
1	BRE5751 (Strategic Management)		✓	3	Nil	Nil	120	50%	50%	BRE			✓	✓	
1	BRE586 (Construction Information Technology)	✓	✓	3	Nil	Nil	120	50%	50%	BRE	✓	✓	✓	✓	✓
1	BRE587 (Research Methods for Construction and Real Estate)	✓	✓	3	Nil	MM501	120	100%	-----	BRE				✓	✓
2	BRE534 (Integrated Project in Intelligent Construction)		✓	3	BRE587^	Nil	120	100%	------	BRE	✓	✓	✓	✓	✓
2	BRE535 (Advanced Visualization and Interactive Technologies for Construction)	✓	✓	3	Nil	Nil	120	100%	------	BRE	✓	✓	✓	✓	✓
2	BRE536 (Automation and Robotics in Construction)	✓	✓	3	Nil	Nil	120	100%	------	BRE	✓	✓	✓	✓	✓
2	BRE537 (Machine Learning and Data Mining for Construction)	✓	✓	3	Nil	Nil	120	55%	45%	50% BRE 50% COMP	✓	✓	✓	✓	✓
2	BRE538 (3D Printing in Construction: Principles and Applications)	✓	✓	3	Nil	Nil	120	100%	------	BRE	✓	✓	✓	✓	✓
	BRE591 (Dissertation)	✓		9	BRE587*^			100%	------	BRE	✓	✓	✓	✓	✓
			Recommended Elective												
1	BRE506 (Principles of Project Management)		✓	3	Nil	Nil	120	50%	50%	BRE			✓	✓	

8.7 Suggested Progression Pattern

8.7.1 Part-time Dissertation Route: 7 compulsory subjects + Dissertation

Part-time	Semester 1	Credits / Semester	Semester 2	Credits / Semester	Summer Term	Credits / Semester
Year 1	#BRE511 Information Management for Construction and Real Estate #BRE587 Research Methods for Construction and Real Estate	6	#BRE536 Automation and Robotics in Construction #BRE537 Machine Learning and Data Mining for Construction	6	N/A	0
	EEE5T03 Engineering Ethics and Academic Integrity (1 credit): in either Semester 1 or 2, decided by the Department of Electrical and Electronic Engineering					
	e-learning module for fulfilling University's National Education Requirement (non-credit bearing)					
Year 2	#BRE586 Construction Information Technology @BRE591 Dissertation	6	#BRE535 Advanced Visualization and Interactive Technologies for Construction #BRE538 3D Printing in Construction: Principles and Applications @BRE591 Dissertation	9	@BRE591 Dissertation	3

#Compulsory subjects.
@Dissertation = 9 credits = 3 compulsory subjects. Students are required to settle credit fee of 9 credits in the 1st semester of registration.
BRE587 (Research Methods for Construction and Real Estate) is co-requisite/pre-requisite subject of taking BRE591 (Dissertation).

8.7.2 Part-time Non-dissertation Route: 9 compulsory subjects (including 1 dissertation replacement subject) + one elective subject

Part-time	Semester 1	Credits / Semester	Semester 2	Credits / Semester	Summer Term	Credits / Semester
Year 1	#BRE511 Information Management for Construction and Real Estate #BRE5751 Strategic Management	6	#BRE536 Automation and Robotics in Construction #BRE537 Machine Learning and Data Mining for Construction	6	N/A	0

	EEE5T03 Engineering Ethics and Academic Integrity (1 credit): in either Semester 1 or 2, decided by the Department of Electrical and Electronic Engineering					
	e-learning module for fulfilling University's National Education Requirement (non-credit bearing)					
Year 2	#BRE586 Construction Information Technology #BRE587 Research Methods for Construction and Real Estate +One Elective Subject	9	#BRE534 Integrated Project in Intelligent Construction #BRE535 Advanced Visualization and Interactive Technologies for Construction #BRE538 3D Printing in Construction: Principles and Applications	9	N/A	0

#Compulsory subjects.
BRE587 (Research Methods for Construction and Real Estate) is pre-requisite subject of taking BRE534 Integrated Project in Intelligent Construction.
+BRE506 (Principles of Project Management) is the recommended elective subject. Students can also choose other elective subject from a pool of subjects offered by the BRE Department or other sister Departments within the Faculty of Construction and Environment, subject to quota availability.

8.7.3 Full-time Dissertation and Non-dissertation Routes (to complete in 1 academic year)

Full-time	Semester 1	Credits / Semester	Semester 2	Credits / Semester	Summer Term	Credits / Semester
Dissertation route	<u>3 compulsory subjects + dissertation</u> #BRE511 Information Management for Construction and Real Estate #BRE586 Construction Information Technology #BRE587 Research Methods for Construction and Real Estate @BRE591 Dissertation	12	<u>4 compulsory subjects + dissertation</u> #BRE535 Advanced Visualization and Interactive Technologies for Construction #BRE536 Automation and Robotics in Construction #BRE537 Machine Learning and Data Mining for Construction #BRE538 3D Printing in Construction: Principles and Applications	15	@BRE591 Dissertation	3

			@BRE591 Dissertation			
	EEE5T03 Engineering Ethics and Academic Integrity (1 credit): in either Semester 1 or 2, decided by the Department of Electrical and Electronic Engineering					
	e-learning module for fulfilling University's National Education Requirement (non-credit bearing)					
Non-dissertation route	<u>4 compulsory subjects + one elective subject</u> #BRE511 Information Management for Construction and Real Estate #BRE586 Construction Information Technology #BRE587 Research Methods for Construction and Real Estate #BRE5751 Strategic Management +One Elective Subject	15	<u>4 compulsory subjects + 1 dissertation replacement</u> #BRE534 Integrated Project in Intelligent Construction #BRE535 Advanced Visualization and Interactive Technologies for Construction #BRE536 Automation and Robotics in Construction #BRE537 Machine Learning and Data Mining for Construction #BRE538 3D Printing in Construction: Principles and Applications	15	N/A	0
	EEE5T03 Engineering Ethics and Academic Integrity (1 credit): in either Semester 1 or 2, decided by the Department of Electrical and Electronic Engineering					
	e-learning module for fulfilling University's National Education Requirement (non-credit bearing)					

#Compulsory subjects.
@Dissertation = 9 credits = 3 compulsory subjects. Students are required to settle credit fee of 9 credits in the 1st semester of registration.
BRE587 (Research Methods for Construction and Real Estate) is co-requisite/pre-requisite subject of taking BRE591 (Dissertation).
BRE587 (Research Methods for Construction and Real Estate) is pre-requisite subject of taking BRE534 Integrated Project in Intelligent Construction.
+BRE506 (Principles of Project Management) is the recommended elective subject. Students can also choose other elective subject from a pool of subjects offered by the BRE Department or other sister Departments within the Faculty of Construction and Environment, subject to quota availability.

9. Programme Management

The overall academic and operational responsibility for the Programme and its development within the established academic policies, procedures and regulations defined by the University will be steered by the Programme Leader and Deputy Programme Leader, overseen by the Chairman and Secretary of the BRE Taught Postgraduate Programme Committee, with due support from the Head of Department and Associate Head (Teaching). The programme team comprises of the following key members:

- Programme Leader
- Deputy Programme Leader
- All Subject Leaders
- Dissertation Co-ordinator
- Programme Officer
- IT Technologist (in support of digital construction education and applications)

10. Assessment of Taught Subjects

10.1 The assessment of a subject is based on one or two components, namely continuous assessment and/or examination. The weighting of continuous assessment and examination as well as the intended subject learning outcomes to be assessed with each component are listed out in the subject description form of each subject.

10.2 Continuous assessment is all forms of assessment other than examination, which may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation done either individually or in groups. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately, which can result in different grades being awarded to students in the same group.

10.3 Examination shall take place on-campus and be invigilated and its duration is 3 hours in most subjects. When on-campus invigilated examination cannot be arranged under exceptional circumstances deemed by the University, online invigilated or take-home examination or alternative assessment methods may be arranged as substitution.

10.4 In general, students are required to pass in all assessment components in order to pass a subject. Other subject-passing requirements, if any, will be specified in the subject description form.

10.5 The Subject Assessment Review Panel will be responsible for safeguarding consistency and fairness of assessment and academic quality. It shall review and finalise the subject grades and grade distribution, before the subject grades being formally released to students and submitted to the Board of Examiners.

11. Dissertation

11.1 Introduction

11.1.1 The dissertation is equivalent to 9 credits and represents 420 – 560 hours of student effort. It should be an exposition of a student's own work and ideas. Where others have had an input (e.g. in a team situation), this should be clearly

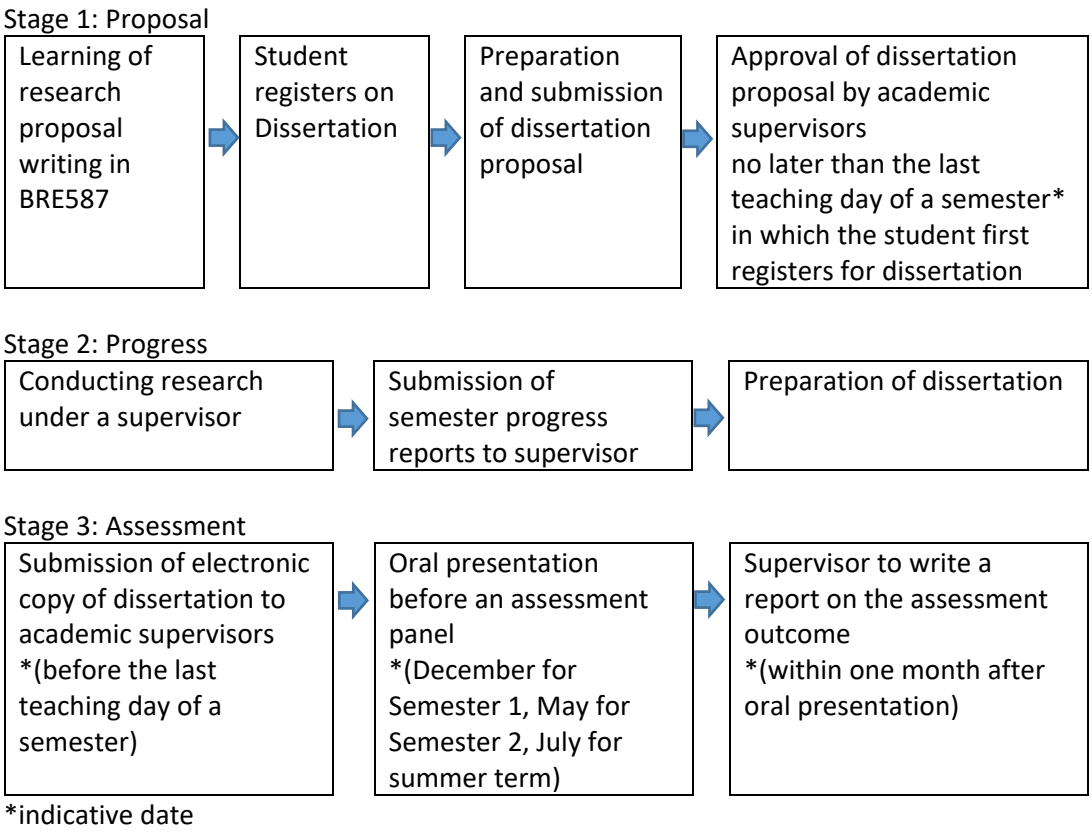
identified. Plagiarism is unacceptable. Expulsion may be imposed in cases of proven plagiarism (see section 26).

11.1.2 Since the subject areas of dissertations are so diverse, it is impossible to define a standard approach to content, but included, should be an introduction and definition of objectives, a literature survey, a review of the problem followed by a description of the student's approach to solving the problem, the results or findings, an intellectual analysis of the results or findings, and finally a logical review of the conclusions drawn.

11.1.3 BRE587 Research Methods for Construction and Real Estate is the co-requisite/pre-requisite requirement for registering dissertation.

11.2 The Process for Dissertation

The process is divided into three stages: preparation, progress and assessment. The entire process is summarised in the diagram below:



*indicative date

11.3 Assessment of Dissertation

11.3.1 The assessment panel will consist of the supervisor and a moderator to provide quality control. After conducting the oral examination, the assessment panel will jointly allocate a grade. In case the supervisor and the moderator have a very different view on the assessment, the Programme Leader concerned will make the final decision.

11.3.2 Students failing their dissertations will not be allowed to re-take their dissertation subjects.

11.4 Duration of Dissertation

The normal period for completion of a dissertation is 3 semesters (including summer term). Those who are not able to complete their dissertations within the normal period may apply on the advice of the supervisor to extend the dissertation registration beyond the normal period but within the maximum period of 4 semesters (including summer term). The application must be endorsed by the relevant Programme Leader and must be approved by the Chairman of BRE Taught Postgraduate Programme Committee. Students approved of extending their dissertation registration beyond the normal period will be required to pay an extension fee as set out in the Student Handbook.

11.5 Dissertation Handbook

Students should refer to the detail guidelines in the Dissertation Handbook (Annex 1).

12. Grading

Assessment grades shall be awarded on a criterion-referenced basis. A student's overall performance in a subject shall be graded as follows:

Subject grade	Short description	Elaboration on subject grading description
A+ A A-	Excellent	Demonstrates excellent achievement of intended subject learning outcomes by being able to skillfully use concepts and solve complex problems. Shows evidence of innovative and critical thinking in unfamiliar situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.
B+ B B-	Good	Demonstrates good achievement of intended subject learning outcomes by being able to use appropriate concepts and solve problems. Shows the ability to analyse issues critically and make well-grounded judgements in familiar or standard situations, and is able to express the synthesis or application of ideas in a logical and comprehensive manner.
C+ C C-	Satisfactory	Demonstrates satisfactory achievement of intended subject learning outcomes by being able to solve relatively simple problems. Shows some capacity for analysis and making judgements in a variety of familiar and standard situations, and is able to express the synthesis or application of ideas in a manner that is generally logical but fragmented.
D+ D	Pass	Demonstrates marginal achievement of intended subject learning outcomes by being able to solve relatively simple problems. Can make basic comparisons, connections and judgments and express the ideas learnt in the subject, though there are frequent breakdowns in logic and clarity.
F	Fail	Demonstrates inadequate achievement of intended subject learning outcomes through a lack of knowledge and/or

		understanding of the subject matter. Evidence of analysis is often irrelevant or incomplete.

'F' is a subject failure grade, whilst all others ('D' to 'A+') are subject passing grades. No credit will be earned if a subject is failed.

13. Retaking of Subjects

13.1 After the announcement of subject results in a semester, students should check whether they have failed any subject via the eStudent and arrange for retaking of the subject during subject registration.

13.2 Students may only retake a subject which they have failed (i.e. Grade F or U), and the number of retake is restricted to a maximum of two (i.e. a maximum of three attempts for each subject). The second retake of a failed subject requires the approval of the Faculty Board Chairman. Students who have failed a compulsory subject after two retakes will be deregistered. An appeal can be submitted to the Academic Appeals Committee (AAC) for a third chance of retaking the subject. In case AAC does not approve further retakes of a failed compulsory subject or the taking of an equivalent subject with special approval of the Faculty, the student concerned would be de-registered and the decision of the AAC shall be final within the University.

13.3 Students paying credit fee will be charged for the subjects retaken.

14. Appeal against Assessment Results

A student may appeal against assessment results. Students should refer to the University Student Handbook for application procedures and relevant regulations.

15. Progression and De-registration

15.1 The Board of Examiners shall, at the end of each semester, determine whether each student is:

(i) eligible for progression towards an award; or
(ii) eligible for an award; or
(iii) required to be de-registered from the programme.

15.2 A student will have "progressing" status unless he/she falls within any one of the following categories, which may be regarded as grounds for de-registration from the programme:

(i) The student has reached the final year of the normal period of registration as specified in the Programme Requirement Document, unless approval has been given for extension; or
(ii) The student has reached the maximum number of retakes allowed for a failed compulsory subject; or
(iii) The student's GPA is lower than 1.7. for two consecutive semesters and his/her Semester GPA in the second semester is also lower than 1.7; or
(iv) The student's GPA is lower than 1.7 for three consecutive semesters.

When a student falls within any of the categories as stipulated above, except for category (i) with approval for extension, the Board of Examiners shall de-register the student from the programme without exception.

15.3 Notwithstanding the above, a student may be de-registered from the programme enrolled before the time frame specified in Sections 15.2(iii) or 15.2(iv) above if his/her academic performance is poor to the extent that the Board of Examiners deems that his/her chance of attaining a GPA of 1.70 at the end of the programme is slim or impossible.

15.4 The progression of students to the following academic year will not be affected by the GPA obtained in an optional Summer Term and that the Summer Term study does not constitute a requirement for graduation, unless otherwise specified in this document.

16. Academic Probation

When a student has a Grade Point Average (GPA) (see section 17 below) lower than 1.70, he/she will be put on academic probation in the following semester. If a student is able to pull his/her GPA up to 1.70 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the assessment result notification but not in the transcript of studies

17. Grade Point Average (GPA)

17.1 At the end of each semester/term, a GPA will be computed as follows, and based on the grade point of all the subjects:

$$\text{GPA} = \frac{\sum_{n=1}^{N} Subject\ Grade\ Point_n \times Subject\ Credit\ Value_n}{\sum_{n=1}^{N} Subject\ Credit\ Value_n}$$

Where N = number of all subjects (inclusive of failed subjects) taken by the student up to and including the latest semester/term. For subjects which have been retaken, only the grade point obtained in the final attempt will be included in the GPA calculation.

If a student has registered for a dissertation, the credits and grade point for the dissertation will be included in the above sums upon the completion of the dissertation.

The credits and grade point of any additional subjects taken on top of the prescribed credits requirements for award will also be taken into account.

17.2 The grade points assigned to subject grades attained are as follows:

A+	4.3
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
F	0.0

Subject which has been given an 'S' subject code, i.e. absent from all assessment components, will be included in the GPA calculation and will be counted as "zero" grade point.

17.3 The following subjects will be excluded from the GPA calculation:

(i) Exempted subjects
(ii) Ungraded subjects
(iii) Incomplete subjects
(iv) Subjects for which credit transfer has been approved, but without any grade assigned
(v) Subjects from which a student has been allowed to withdraw (i.e. those with the code 'W')

17.4 GPA is thus the unweighted cumulative average calculated for a student, for all relevant subjects taken from the start of the programme to a particular point of time. GPA is an indicator of overall performance, and ranges from 0.00 to 4.3. GPA is capped at 4.3.

18. Eligibility for Award

18.1 Master of Science

A student would be eligible for the award of Master of Science in Intelligent Construction on satisfying all the subject and/or dissertation, credits and GPA requirements as defined and/or stipulated in this document and all other graduation requirements as specified by the University.

18.2 Postgraduate Diploma

18.2.1 A student should be awarded a Postgraduate Diploma in Intelligent Construction if he/she falls within any one of the following categories:

(i) The Board of Examiners agrees that the student is eligible for a Postgraduate Diploma award and he/she cannot be eligible for the Master's award even though the Master's award was his/her intended award; or
(ii) The student has reached the end of the normal period of dissertation registration but has not obtained approval to extend his dissertation registration period and has fulfilled the graduation requirements for a Postgraduate Diploma award; or
(iii) The student applies to graduate with a Postgraduate Diploma award based on personal reasons and has fulfilled the relevant graduation requirements and is agreed by the Board of Examiners.

18.2.2 The graduation requirements for Postgraduate Diploma in Intelligent Construction include all of the following:

(i) Accumulating 21 credits from the designated compulsory subjects and/or dissertation as defined and/or stipulated in this document
(ii) Having a GPA of 1.7 or above
(iii) Satisfying the Academic Integrity and Ethics requirement (1 credit)
(iv) Satisfying the National Education requirement
(v) Fulfilling all other graduation requirements as specified by the University

18.3 A student may take more credits than he/she needs to graduate on top of the prescribed credit requirements for his/her award in or before the semester within which he/she becomes eligible for award.

18.4 A student is required to graduate as soon as he/she satisfies all the conditions for award. Upon confirmation of the eligibility to graduate or leaving the University, registration for subjects (including the follow-on term of consecutive subjects) in the following semester / Summer Term will be nullified and removed.

19. Guidelines for Award Classifications

19.1 When a student has satisfied the requirements for award, an Award GPA will be calculated to determine his/her award classification. Same as for GPA, Award GPA ranges from 0.00 to 4.3.

19.2 The following GUIDELINES will be used by the Board of Examiners to recommend the classification of the award:

	Guidelines
Distinction	The student's performance/attainment is outstanding, and identifies him/her as exceptionally able in the field covered by the programme in question.
Credit	The student has reached a standard of performance/attainment which is more than satisfactory but less than outstanding.
Pass	The student has reached a standard of performance/attainment ranging from just adequate to satisfactory.

19.3 Award GPA Ranges for Award Classification

Award Classification	Award GPA Range
Distinction	3.60 - 4.30
Credit	3.00 - 3.59
Pass	1.70 - 2.99

19.4 Any subjects passed after the graduation requirements have been met or additional subjects taken on top of the prescribed credit requirements for award and not for satisfying the award requirements will not be counted towards the award GPA in determining the award classification.

20. Subject Registration and Withdrawal

20.1 Students need to register for the subjects at specified periods prior to the commencement of the semester. An add/drop period will also be scheduled for each semester/term. It is a student's responsibility to check if his/her subject registration will fulfil the graduation requirements.

20.2 The maximum study load allowed is 21 credits per semester.

20.3 Students may apply for withdrawal of their registration on a subject after the add/drop period and before the commencement of the examination period if they have a genuine need to do so and when the tuition fee of the subject concerned has been settled. The application will require the approval of both the subject leader and the Programme Leader concerned. Applications submitted after the commencement of the examination period will not be considered. For approved applications of subject withdrawal, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the assessment result notification and transcript of studies, but will not be counted in the calculation of the GPA.

20.4 Students should refer to the University Student Handbook for subject registration procedures and relevant regulations.

21. Credit Transfer

21.1 At the discretion of the Department and on the recommendation of the Programme Leader, students may be given credit for previous postgraduate study. Application must be submitted via eStudent. A fee will be charged for credit-fee-paying students for credits successfully transferred.

21.2 Credit transfer will only be granted to subjects with B or above but without the grade being carried over or counted in the students' GPA. The credits transferred will count towards the credit requirement for the award. All credit transfers approved will take effect in the semester for which they are approved. A student who applies for transfer of credits for a particular semester will only be eligible for graduation at the end of that semester, even if the granting of the credit transfer will immediately enable the student to satisfy the credit requirement for the award.

21.3 The validity period of subject credits earned is eight years from the year of attainment, i.e. the year in which the subject is completed, unless otherwise specified by the Department responsible for the contents of the subject. Credits earned from previous studies should remain valid at the time when the student applies for credit transfer. For exceptional cases such as those stated in (i) to (iii) below, the subject offering Department shall have the discretion to approve the transfer of credits which have exceeded the validity period on a case-by-case basis. All such exceptional cases must be reported to the Faculty Board with full justifications.

Exceptional cases:

(i) Mature learners whose previous studies were mostly completed a long time before their admission to this University, but who have working experience which would have kept them actively involved in the relevant area of study. The flexibility to be granted to these students based on academic comparability of subjects is in line with the policy of the University in promoting life-long learning.

(ii) Students for whom the expiry of validity of credits is beyond their control, e.g. due to medical reasons.

(iii) Students have been approved for deferment of study.

21.4 No more than 30% of the normal credit requirement for an academic award may be transferred from programmes either within or outside of the University.

21.5 The combined credit transfer from programmes within and outside the University may not exceed 30% of an award.

21.6 Credits earned from subject-based studies at PolyU which have never been used for another degree may be applied to credit transfer up to 67% as per University regulations.

22. Subject Exemption

22.1 Students may apply to be exempted from taking any specified subjects if they have successfully completed similar subjects from previous postgraduate study. The credits associated with the exempted subject will not be counted for satisfying the credit requirements of the programme. It will therefore be necessary for the students to consult the Programme Leader and take another subject in order to satisfy the credit requirement for the award.

22.2 Students wishing to be exempted from taking the compulsory subjects must apply in writing to the Department via the Programme Leader providing evidence of previous postgraduate study equivalent to the subject(s) from which exemption is claimed before submitting the application at eStudent.

23. Zero Subject Enrolment

Students are not allowed to take zero subject in any semester unless they have obtained prior approval from the Department; otherwise they will be classified as having unofficially withdrawn from the programme. Any semester in which a student is allowed to take zero subject will nevertheless be counted towards the total period of registration. A fee for retention of study place will be charged. Students should refer to the University Student Handbook for relevant procedures and regulations.

24. Deferment of Study

Students may apply for deferment of study if they have a genuine need to do so such as illness or posting to work outside Hong Kong. Approval from the Department is required. The deferment period will not be counted towards the total period of registration. Students should refer to the University Student Handbook for relevant procedures and regulations.

25. Withdrawal of Study

If students wish to formally discontinue their study at the University before completing the programme, they should complete the withdrawal procedure via eStudent. Fees paid for the semester in which students are studying will not be refunded. Applications for withdrawal of study for the current semester must be submitted before the commencement of the examination period. The Department/University will not process the applications if students have not cleared outstanding matters with the various departments/offices concerned, such as settling outstanding fees/fines and Library loans. Students should refer to the University Student Handbook for relevant procedures and regulations.

26. Academic Integrity and Misconduct

26.1 Academic integrity exists when students do their academic work in an honest and ethical manner, following the conventions and code of practice of their chosen discipline or profession.

26.2 The University believes that academic integrity is central to the mission of a university, and expects its students to adhere to high standards of academic integrity in all forms of assessments including assignments and examinations.

26.3 The University views any violations of academic integrity as a serious disciplinary offence because it seriously undermines the value of the teaching, learning and research of the University. Students who cheat in their academic work limit their learning because they have not undergone the learning experience intentionally designed to help them gain the specific knowledge or skills. At the same time, if some students cheat in the assessment and get a good grade, it is not fair to others who are honest and do their own work. Finally, academic dishonesty will tarnish the reputation of the programme and its graduates and, in the long run, diminish the value of the degree or education from the University.

26.4 Students should therefore refrain from committing any acts of academic dishonesty, including but not limited to the following:

- Cheating
- Plagiarism
- Unauthorised collaboration or help
- Fabrication and Falsification
- Aiding academic dishonesty

26.5 The University attaches great importance to academic integrity and honesty and upholds high standard in examination and in continuous assessment. In case of proven dishonesty including plagiarism, disciplinary actions will be taken by the department concerned or the Student Discipline Committee. The penalty is detailed in Section 11 on Regulations and Rules of the Student Handbook.

27. Prevention of Bribery Ordinance

PolyU staff members may in no circumstances solicit or accept an advantage. For relevant details, please refer to the Prevention of Bribery Ordinance (Cap. 201) of the Laws of Hong Kong at https://www.elegislation.gov.hk/.

28. Subject Description Form

Compulsory Subjects

- BRE511 Information Management for Construction and Real Estate
- BRE534 Integrated Project in Intelligent Construction
- BRE535 Advanced Visualization and Interactive Technologies for Construction
- BRE536 Automation and Robotics in Construction
- BRE537 Machine Learning and Data Mining for Construction
- BRE538 3D Printing in Construction: Principles and Applications
- BRE586 Construction Information Technology
- BRE587 Research Methods for Construction and Real Estate
- BRE5751 Strategic Management
- EEE5T03 Engineering Ethics and Academic Integrity

Recommended Elective Subject

- BRE506 Principles of Project Management

(Notes:
For subjects not listed above offered by BRE / other Departments / other Faculties which may be taken as elective subject, their synopsis can be found via the "Subject Search" function in the eStudent.)

Subject Description Form

Subject Code	BRE511
Subject Title	Information Management for Construction and Real Estate
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims at understanding of how data and information is designed, created, used and managed in the construction industry with emphasis on information modelling and management at the project and organization levels.
Intended Learning Outcomes	By the end of this subject, students will be able to: a. understand the basic concepts of the creation and management of data and information within construction projects; b. understand contemporary issues in information management at project and organization level; c. apply basic building modelling knowledge to construction projects through the selection, development and implementation of information systems.
Subject Synopsis/ Indicative Syllabus	Information systems: information management; e.g. information distribution, access, securing and control; the strategic management of information and communication technologies assessing the business benefits of information technologies, knowledge management, IT and organization change. Understand current information systems and management procedures within the construction industry; relevant legislation impact of information systems; building information modelling; integrated property and construction industry databases; and construction project-based systems. Case studies from both large and small construction organizations will be used to illustrate current systems within the industry.

Teaching/Learning Methodology	• Lectures
	• Training exercises on information systems (including Microsoft Project, Autodesk Revit and Navisworks)
	• Independent study and teamwork
	  • Assignments
	  • Individual and team projects
	  • Case study and presentation

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			
1. Assignment	30%	✓	✓	✓			
2. Individual Report	30%	✓	✓	✓			
2. Group Report	40%	✓	✓	✓			
Total (Continuous Assessment*)	100 %						

*Students are required to achieve grade D or above in overall subject grade to pass the subject.

Assignments require students to work on questions to help them for understanding of fundamental knowledge of the management of data and information within construction projects.

Individual projects require students to work individually and submit an individual report that is focused on topics of IT-related information management application in construction projects.

Students will also need to work in a project team for the group project. Group project will be focused on potential applications of IT systems, BIM, AI, and Big Data analytics to solve existing practical problems during the life cycle of a construction project. By working together in a team environment and working on real-world working practices, students will be able to test information-management practices in the way to become creative and innovative practitioners.

Reading List and References

Shen, Q.G., Brandon, P., & Baldwin, A., (2009) Collaborative Construction Information Management, Taylor & Francis.

Eastman, C., Eastman, C.M., Teicholz, P., Sacks, R. & Liston, K. (2011). BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, John Wiley & Sons.

Smith, D.M. & Tardi, F.M. (2009) Building information modeling: a strategic implementation guide for architects, engineers, constructors, and real estate asset managers, Jolm Wiley and Sons.

Electronic Journal of Information Technology in Construction, www.itcon.org.

CIC, Construction Industry Council (2014), Roadmap for Building Information Modelling in Hong Kong's Construction Industry.

CIC, CIC BIM Standards – General (August 2019); (Version 2 - December 2020) and (Version 2.1 - 2021)

	CIC BIM Standards for Architecture and Structural Engineering (Version 2 - December 2020); and (Version 2.1 - 2021); CIC BIM Dictionary (December 2020); and (2021);

Subject Description Form

Subject Code	BRE534
Subject Title	Integrated Project in Intelligent Construction
Credit Value	3
Level	5
Pre-requisite	BRE587 Research Methods for Construction and Real Estate
Objectives	This subject is intended to: a. Develop capability of critical investigation, analysis and synthesis in solving problems in Intelligent Construction professional context. b. Develop capability for identifying, collecting, analyzing and presenting information to finding solutions to the practical problems in Intelligent Construction. c. To integrate the core subjects of Intelligent Construction study into real-world case studies.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. select and pursue in depth, a non-trivial topic relevant to professional practice in the field of Intelligent Construction; b. complete a substantial piece of work autonomously, with guidance from a supervisor but without detailed day-to-day supervision; c. formulate a set of questions in a way that renders them amenable to rigorous investigation; d. discriminate and identify in the available written material which is useful to the topic under investigation; e. identify and make use of methods of investigation appropriate to the subject; f. draw conclusions that are based on the work undertaken and relevant to Intelligent Construction and assess the limitations of those conclusions; g. write up a comprehensive report and present an individual project in an appropriate style.
Subject Synopsis/ Indicative Syllabus	The key learning strategy for the subject is that of learning by doing. Students are expected to work independently and individually, reflecting on the experience of the work in progress and feedback from the supervisor. The principle educational aims for the subject are to promote the following abilities and disciplines: • Self-learning • Independence of thought • Critical evaluation • Formulation and research of complex problems • Communication of complex ideas and conclusions

<table>
<tr><td>Teaching/Learning Methodology</td><td>The subject consists of an introduction workshop at the first week (one lecture) of the semester outlining the requirement of the subject. Students then submit their research proposal and will be allocated supervisors according to their areas of research interest. Students will then work independently and meet with their supervisors regularly in the tutorials (13 weeks) for supervision. Students are required to submit the final reports for assessment.
Individual presentation
Independent study
Individual assignment
Self-study</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a., b.</td><td>c., d.</td><td>d., e.</td><td>f.</td><td>g.</td></tr>
<tr><td>1. Proposal</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>2. Research-based paper</td><td>85%</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Total(Continuous Assessment*)</td><td>100%</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
*Students are required to pass all the specific assessment methods/tasks to pass the subject.

Writing research proposal will develop students’ skills in the preparation of a research proposal for a chosen topic, including design of study, conduct of literature review, and test of the feasibility of proposed research.

Writing research-based paper will develop students’ capacity for conducting an independent, analytical study in the area of Intelligent Construction in professional and academic context.</td></tr>
<tr><td>Reading List and References</td><td>Carlo Domingo Casinto (2019), Doing Academic Research with Ease: Five Basic Methods Every Novice Researcher Should Know, KDP Print US.

Pagadala Suganda Devi (2017), Research Methodology: A Handbook for Beginners, Notion Press.

Fellows, R. and Liu, A. (2008), Research Methods for Construction, 3rd Edition, Wiley-Blackwell.

Lester J.D. and Lester J.D. (2007). Writing Research Papers; a complete guide, 12 Edition, Longman.</td></tr>
</table>

Subject Description Form

Subject Code	BRE535
Subject Title	Advanced Visualization and Interactive Technologies for Construction
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject is intended to: 1. Equip students with a holistic understanding of eXtended Reality (XR) concepts and how different visualization and interactive technologies have been using in current construction practice to achieve digital construction management. 2. Be aware of the range of visualization and interactive technologies available for construction and gain an understanding of the key concepts determining classification, features and applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Relate basic technical vocabulary and terminology for various visualization and interactive technologies in construction. b. Possess knowledge of fundamental principles of visualization and interactive technologies c. Acquire preliminary skills to design, program, and establish corresponding visualization and interactive environment for construction. d. Relate the inter-relationships among visualization/interactive technologies with construction practices and derived applications e. Interpret and extract information from existing digital construction details with visualization and interactive technologies.
Subject Synopsis/ Indicative Syllabus	The subject contains three teaching packages as below: **<u>Digital Visualization Principles (4 lectures)</u>**: • Introduction to visualization and interactive technologies • Object transformation, viewing, projection, and lighting • Rigid body motion and physics in the virtual environment • Modelling theorems and data visualization

<table>
<tr><td></td><td>

<u>Visualization Aids and Interfaces (4 Lectures)</u>:

- Human computer interaction and usability
- Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR), Immersive visualization and cooperative environment
- CAD, BIM, and digital twins

<u>Visualization/Interactive Applications in Construction (5 Lectures)</u>:

- Visual communication and gestures in construction
- Construction inspection and progress monitoring
- Construction equipment modelling and planning
- Construction productivity analysis
- On-site safety management and occupational safety and health

</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>

The mode of delivering the subject comprises lectures and tutorials. Lectures aim at delivering the basic core concepts and knowledge about visualization and interactive technologies in construction, which are to be discussed and consolidated through tutorials.

Furthermore, tutorials are also used for students' exercises technically on visualization and interactive toolkits, environment and applications, providing hands-on experience to students on selected topics.

</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td></td></tr>
<tr><td>1. Tutorial Exercises</td><td>25%</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>2. Assignments</td><td>25%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>3. Term Project</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td></tr>
<tr><td>Total (Continuous Assessment*)</td><td>100 %</td><td colspan="6"></td></tr>
</table>

*Students are required to pass all the specific assessment methods/tasks to pass the subject.

Tutorial exercises throughout the entire semester on each session will be used to assess students' learning outcomes on the basic knowledge learned from the lecture sessions.

Two assignments, explicitly looking for potential solutions to two construction-related problems, will be used for students to practice and enhance learning outcomes.

</td></tr>
</table>

	The term project allows students to choose specific topics on applications of visualization and interactive technologies in construction. They have to conduct in-depth study and this can enhance the depth of the knowledge learned through the potential implementation and integration upon their creativity. No examination is required in this subject.
Reading List and References	Textbooks are not compulsory in the subject, while some supplementary readings to enhance students' understanding are listed below: Hughes, J. F., van Dam, A., McGuire, M., Sklar, D. F., Foley, J.D., Feiner, S. K. and Akeley K. (2013) Computer Graphics: Principles and Practice, 3rd edition, Addison-Wesley Professional Peurifoy, R. L., Schexnayder, C. J., Schmitt, R. and Shapira, A. (2018) Construction Planning, Equipment, and Methods, 9th Edition, McGraw-Hill Education Rubin, J. and Chisnell, D. (2008) Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests, 2nd edition, Wiley Well, R. (2020) Unity 2020 By Example: A project-based guide to building 2D, 3D, augmented reality, and virtual reality games from scratch, 3rd Edition, Packt Publishing

Subject Description Form

Subject Code	BRE536
Subject Title	Automation and Robotics in Construction
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject is specially devised for master students of the MSc in Digital Construction programme offered by the Department of Building and Real Estate. Its objectives are to: (a) Enthuse the students about digital construction, especially construction automation and robotics; (b) Cultivate students' creativity, problem-solving ability, and global outlook; (c) Expose students to the concepts and an understanding of sensing technologies, robotics, and their application in construction.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand the necessity of involving automation and robotics in construction; (b) Understand the multi-disciplinary nature of the construction industry; (c) Understand the use of sensing technology and robotics; (d) Demonstrate creative and critical thinking, global outlook, problem solving and communication abilities for addressing issues in the construction industry with sensing and robotic technologies.
Subject Synopsis/ Indicative Syllabus	The subject will cover the following content: **Emerging imaging and sensing technologies for the construction industry:** Introduction to emerging imaging and sensing technologies for 3D reconstruction of construction sites, location and action tracking of construction equipment and personnel, and their integrations with digital modelling technologies for automating the monitoring of construction progress, productivity, safety, and quality. **Robots and exoskeletons in construction:** Introduction to the fundamentals of robotic systems and their components. Introduction to basic types of construction robots and exoskeletons in use or development today as well as their applications. Discussion on the benefits and barriers of deploying robotic and exoskeleton technologies into the construction industry, including potential safety and ethical issues, and prospects for building

<table>
<tr><td></td><td>automated or smart construction sites with these technologies in the future.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The teaching and learning methodology involve inspirational lectures, group work, assignments, and practitioners'/alumni' seminars. The knowledge gained from the inspirational lectures in the subject constitute a part of the foundation for students in developing their creative thinking and problem solving abilities. Practitioners'/alumni' seminars are arranged to introduce students how the knowledge is applied in practice, the gap between theory and practice in the industry.

Through the project group work, students are expected to base on what they learn through lectures and practitioners'/alumni' seminars to come up with pragmatic solutions/ideas that demonstrate their creative thinking, problem solving, global outlook and entrepreneurship abilities for addressing issues in construction with automation and robotics.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1.Assignment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Project group work</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Total (Continuous Assessment*)</td><td>100 %</td><td colspan="6"></td></tr>
</table>
*Students are required to pass all the specific assessment methods/tasks to pass the subject.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The assessment task 1 is knowledge-oriented and plays a part in addressing the intended learning outcomes (a) – (c) covered in inspirational lectures. The assessment task includes four assignments.

The assessment task 2 is high-order in nature and the project group work serves as a main and effective assessed task (i.e., 60% of the overall assessment grade) for students to demonstrate their overall attainment of intended learning outcomes (a) – (d) at the end of the curriculum.</td></tr>
<tr><td>Reading List and References</td><td>ASCE Journal of Computing in Civil Engineering (http://www.asce.org)

Elsevier Journal of Automation in Construction. (http://www.elsevier.com/locate/autocon)</td></tr>
</table>

	Brilakis, I. & Haas, C. (2019). Infrastructure Computer Vision (1st ed.), Butterworth-Heinemann Bock, T., & Linner, T. (2015). Robot-Oriented Design (The Cambridges handbooks in construction robotics). Cambridge University Press. Dinwiddie, K. (2016). Basic robotics. Boston, MA: Cengage Learning. Siciliano, B., & Khatib, O. (2016). Springer Handbook of Robotics (2nd ed., Springer Handbooks). Cham: Springer International Publishing AG.

Subject Description Form

Subject Code	BRE537
Subject Title	Machine Learning and Data Mining for Construction
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The overall objective of this course is to provide students with hands-on and fundamental knowledge of machine learning and data mining techniques to solve problems of modern construction projects and to carry out data analytics in construction. Specifically, this subject aims at: • Introducing the principles, concepts and models of modern machine learning and data mining. • Practicing the analytics skills to analyze data from construction areas and gain insight into it. • Understanding the practical applications of machine learning and data mining techniques in the construction industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand the essential concepts of machine learning and data mining models and algorithms. (b) Use machine learning tools to develop data analytics solutions for solving real-world problems in construction projects. (c) Apply various supervised and unsupervised machine learning models to gain insight into various kinds of data arising from modern construction projects. (d) Understand the fundamental knowledge of data mining in collecting, organizing, summarizing, presenting, and analyzing data and drawing valid conclusions.
Subject Synopsis/ Indicative Syllabus	**Fundamental of machine learning and data mining (7 weeks)** • Data, Database & Data Warehouse, and Data Analytics: Defining data requirements, collecting data, cleaning data, storing data, processing data, analyzing data, and visualizing data. • Association Rule Mining: Apriori algorithm, interestingness measures, applications. • Supervised Learning: Classification and Regression Tree (CART), kNN, etc. • Deep Supervised Learning: Neural Networks (NN) and Convolutional Neural Networks (CNN) • Unsupervised Learning: k-means clustering and spatial clustering

<table>
<tr><td></td><td>

- Deep Unsupervised Learning: dimensionality reduction, Autoencoder.
- Machine Learning and Data Mining Tools: TensorFlow, Pytorch, etc.

Applications of Machine Learning and Data Mining in Construction (6 weeks)

- Prediction and design of construction materials performance by machine learning and data mining
- The applications of machine learning on architectural design.
- Machine learning and data mining tools in 3D concrete printing.
- Manging the construction life-cycle activities using machine learning and data mining.
- Occupational health and safety monitoring.
- Damage prognosis: health monitoring of civil infrastructures.
- Building energy consumption analysis, prediction, and optimisation

</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>

Lectures teach students on the main concepts of the course, together with comprehensive examples, and class questions and answers for easy understanding.

Tutorials help students to review the learned concepts, master the practical techniques and necessary tools for effective system/application development.

Labs and group project projects focused on analytics problems faced by cities, infrastructure, and environment, and offers the opportunity to students to develop analytical and problem-solving skills through system implementation and interpersonal communication.

</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td></tr>
<tr><td>1. Continuous assignment*</td><td>55%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>a. Project</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>b. Assignments</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>c. Lab works</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>2. Examination*</td><td>45%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>

</td></tr>
</table>

	*Students are required to pass both the continuous assessment and examination to pass the subject. Continuous assessments consist of projects, assignments, and laboratory works, which are designed to facilitate students to achieve intended learning outcomes. Assignments are designed to ensure the students understand the concepts. The project is to enhance students' ability to acquire the understanding and using different knowledge, principles, techniques, tools to solve a real problem through team. Lab works are to ensure the students gain hands-on experience from machine learning tools. Examination will evaluate student's understanding and usage of machine learning and data mining techniques in construction.
Reading List and References	1. Jake VanderPlas, Python Data Science Handbook, O'Reilly Media, 2016. 2. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, O'Reilly Media, 2019. 3. Jared Dean, Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners. Wiley, 2014. 4. EMC Education Services (Editor), Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley, 2015. 5. Leskovec, Rajaraman, Ullman, Mining of Massive Datasets, 2nd Ed., Cambridge University Press, 2014. 6. Jiawel Han and Micheline Kamber, Data Mining: Concepts and Techniques. Morgan Kaufmann Publishers, 2012. 7. I. Goodfellow, Y. Bengio and A. Courville, Deep Learning, MIT Press, 2016. 8. Scikit-learn Machine Learning in Python https://scikit-learn.org/

Subject Description Form

Subject Code	BRE538
Subject Title	3D Printing in Construction: Principles and Applications
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are: **1.** Equips students with an understanding of 3D printing, and how the technology works with different construction materials and their related applications in the construction sector. **2.** Develop strong competencies of students in advanced construction materials in 3D printing, digital design, and fabrication, enabling them to take leading positions in the field of architecture, construction, innovation development, and production management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand the technical principles and workflows for 3D printing of various construction materials, including metals, polymers, composites, etc. (b) Learn how to select a 3D printing process and material for a specific application in the construction sector. (c) Design structure for 3D printing by combining process knowledge, computational design tools, and application requirements. (d) Understand cutting-edge perspective on digital transformation and the factory of the future.
Subject Synopsis/ Indicative Syllabus	**1. Introduction and Basic Principles of 3D Printing** • Recap the conventional construction methods, including cast in situ, precast, spray concrete, etc. • Introduction to the generic process of 3D printing. • Compare the distinction between conventional construction methods and 3D printing • Case study: Analyse the benefits of 3D printing in construction with real examples. **2. 3D printing of Metals, Polymers, Glass and Clay**

	• Introduction to the 3D printing with metals, polymers, glass and clay, including printing process, material selection & modelling, quality control, and post processing. • Take real examples as case study for further explain their related applications in construction sector. **3. Extrusion-based 3D concrete printing** • Introduction to the classification of extrusion-based 3D concrete printing, including gantry system and robotic system. • Introduction to a general process of extrusion-based 3D printing, from equipment setup, material section, 3D CAD modelling to the final printing process. System concept on the extrusion-based 3D concrete printing. • Functional nozzle design, including current existing designed functional nozzle and basic operation of 3D CAD software. **4. Printable Material Design & Reinforcement** • Printable material selection, including material ingredients' effects, material constitutive model, and mixture design method. • Chemical additives' effects on the printable material hydration, fresh and hardened performance, and their applications in the material design of 3D concrete printing. • Material modelling, including buildability model, pumpability model, extrudability model, rheo-mechanical model. • Introduction to the function printable material, including printable strain-hardening construction material, printable transparent construction material, printable lightweight/sustainable material, etc. • Introduction to the method to introduce the reinforcement in the printed structures/materials. **5. Testing Methods & Quality Control in 3D Concrete Printing** • Recap conventional testing methods of construction materials/structures. • Introduction to the developed method in 3D concrete printing for the material and/or structural testing. • Recap the conventional quality control methods of construction materials/structures. • Introduction to the developed method in 3D concrete printing for the material and/or structural testing by digital technologies, including computer vision, machine learning, etc. **6. Particle-bed binding & Material jetting** • Introduction to the general process of particle-bed binding & material jetting

	• Raw material ingredients' selection and mixture design for these two processes. Systematic concept on the material modelling. • Factors impacting on the final printed structures and the underlaying mechanism will be introduced **7. Computational Method of 3D Printing in Construction** • Introduction to dynamo and grasshopper and their basic operation methods in the parametric structural design. • Basic programming skills. The students will gradually build up skills from the fundamental concepts to programming skills, including procedural, imperative, and functional programming (Python, Dynamo, Grasshopper etc.) **8. Applications of 3D Printing in Construction & Other Digital Construction Methods** • Take several practical examples to explain the potential applications of 3D concrete printing, including the 3D printed bridge in the Netherland, the 3D printed choreography in Switzerland, the 3D printed Bathroom Unit in Singapore, and the 3D printed green buildings in China. • Introduction to other digital construction methods, including mesh mould, smart dynamic casting, spatial timber assemblies, in situ robot fabrication, laser melting, spray-based 3D printing, etc.
Teaching/Learning Methodology	**1.** Lectures teach students on the main concepts of the course, together with comprehensive examples and class questions and answers for easy understanding. **2.** Laboratory tour with a concrete printing demonstration to help students build an overview of the real concrete printing process. **3.** Tutorial sessions help students review the learned concepts and master the practical techniques and necessary tools for effective system/application development. **4.** Group project offers the opportunity to students to develop analytical and problem-solving skills through system implementation and interpersonal communication.

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		
1. Project*	40%	✓	✓	✓	✓		
2. Presentation*	40%	✓	✓	✓	✓		
3. Quiz*	20%	✓	✓	✓			
Total	100 %						

*Students are required to pass all the specific assessment methods/tasks to pass the subject.

Continuous assessments consist of project, presentation and quizzes, are designed to facilitate students to achieve intended learning outcomes.

The project is designed to enhance students' ability to understand and use different knowledge, principles, techniques, and tools to design a structure and print through team.

Quizzes are to ensure the students understand the concepts and will comprise multiple-choice and short answer questions on 3D printing in construction, including printing process, printable materials, chemical additives, testing method and quality control, etc.

Reading List and References

1. Jay Sanjayan Ali Nazari Behzad Nematollahi, 3D Concrete Printing Technology, First Edition, Butterworth-Heinemann, 2019
2. Chee Kai Chua and Kah Fai Leong, 3D Printing and Additive Manufacturing - Principles and Applications, The Fifth Edition of Rapid Prototyping: Principles and Applications World Scientific Publishing Co., 2017.
3. Victoria Zukas and Jonas A. Zukas, An Introduction to 3D Printing, First Edition Design Publishing, Inc., 2015.
4. Bachman, David. Grasshopper: Visual Scripting for Rhinoceros 3D. Industrial Press, 2017.
5. Jabi, Wassim. Parametric design for architecture. Hachette UK, 2013.
6. https://compas.dev/

Subject Description Form

Subject Code	BRE586
Subject Title	Construction Information Technology
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject focus towards the application of IT in construction with emphasis on construction project management, construction information modeling and information technology service management.
Intended Learning Outcomes	By the end of this subject, participants should be able to: a. understand the ways of construction management workflow and dataflow analyses for the implementation of integrated construction management systems; b. understand the state of art of the information technologies and their applications in construction; c. understand the importance of disruptive technologies and information technology service management.
Subject Synopsis/ Indicative Syllabus	Unit 1. Construction Integrated Management System - Site Management. Unit 2. Construction Integrated Management System - Web-based PM and WPIS. Unit 3. BIM concept and applications. Unit 4. BIM and construction virtual prototyping technology. Unit 5. Case studies of using BIM and Construction Virtual Prototyping technology. Unit 6. Internet Technology and its Application to Construction. Unit 7. Database applications; Information Technology Service Management.

Teaching/Learning Methodology	• Lectures and seminars
	• Independent study
	  • Assignments
	  • Case study
	  • Self-study
	  • Computing

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.			
1. Assignment*	50%	√	√	√			
2. Examination*	50%	√	√	√			
Total	100%						

*Students are required to pass all the specific assessment methods/tasks to pass the subject.

Assignment requires students to work individually and submit an individual report that is focused on topics of IT applications on construction projects.

Examination will test students' understanding of fundamental knowledge of the application of IT in construction with emphasis on construction project management, construction information modeling and information technology service.

Reading List and References

ASCE Journal of Computing in Civil Engineering. *www.asce.org*.

Automation in Construction. An International Research Journal. *www.elsevier.com/locate/autocon*.

CIC, Construction Industry Council (2014), Roadmap for Building Information Modelling in Hong Kong's Construction Industry.

CIC, Construction Industry Council (2015), CIC Building Information Modelling Standards (Phase One) September 2015.

Electronic Journal of Information Technology in Construction, *www.itcon.org*.

Abid N, Wong K.D, Wong K.W "Bill of Quantities with 3D Views Using Building Information Modeling" in April 2015. Arabian Journal for Science and Engineering DOI 10. 1007/s13369-015-1657-2, ISSN 1319-8025.

Wong K.D. (2010) "*Attributes of Building Information Modelling Implementation in Various Country*" Journal of Architectural Engineering and Design Management", Special Issue in Integrated Design and Delivery Solutions, Page 288 to 302, Volume 6(4), November 2010, ISBN 978-1-84971-275-0.

Wong K.D. (2003) *Construction Integrated Management System for Contractors*, Journal of Building and Construction Management, Volume 8, Number 1, 2003, ISSN 102419540, pp. 12-18.

Wong K.D. (2013), "*Implementation of web-based construction project management system in China projects by Hong Kong developers*", Journal of Construction Innovation: Information, Process, Management, Jan 2013, Vol. 13 DOI/10.1108/14714171311296048 pp. 26 – 49.

Wong K.D. (2006), "*Use of Smart Card for Enhancing Construction Site Human Resources Management*" Journal of Building and Construction Management. Page 63 Volume 10 Number 1 2006 ISSN 102419540.

Subject Description Form

Subject Code	BRE587
Subject Title	Research Methods for Construction and Real Estate
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Mutually exclusive with MM501
Objectives	To meet the need of those who wish to contribute to the identification of business and project problems, to select appropriate techniques for their solution and to present and communicate their findings in a logical way.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. define research and distinguish between research and other forms of enquiry; b. describe the features of the scientific method and to apply them to problems in construction and property; c. properly define and undertake a specific problem orientated research; d. formulate questions in a way which renders them amenable to rigorous investigation; e. know where and how to search for literature/information for research and consultancy work; f. assess the usefulness of research methods for particular problems using as criteria the hallmarks of good research; g. identify, collect, analyse and present information appropriate to finding a solution to the problem; h. describe broadly the strengths and limitations of basic approaches to qualitative and quantitative research; i. effectively communicate the findings of their work orally and in written form.
Subject Synopsis/ Indicative Syllabus	• Introduction to research methodologies • Formulation of a research problem • Library session on information management • Guest speakers on consultancy strategies and tactics; • Research methods in construction management

<table>
<tr><td></td><td>

Qualitative and quantitative data analysisPreparation of research proposal and research paper
Dissertation writing

</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>
Students are required to attend the seminars presented by guest speakers.

They are also required to attend the library workshop and complete a quiz administered by the Faculty Librarian of the University Library.

There will be a take-home assignment in the form of a case study report. Students are required to set assumptions, collect data, decide the test methods and draw conclusions from the results.

Students are also required to present the research proposal and research findings in class.
</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="10">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td></td></tr>
<tr><td>1. Take-home assignment: write research proposal</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Take-home assignment: report research findings</td><td>40%</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>3. Oral presentation for research proposal</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4. Oral presentation for research paper</td><td>10%</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Total
(Continuous Assessment*)</td><td>100%</td><td colspan="10"></td></tr>
</table>
*Students are required to achieve grade D or above in overall subject grade to pass the subject.

Writing research proposal will develop students’ academic skill in the preparation of a research proposal for a chosen topic.

Reporting research findings will develop students’ academic skill in the presentation of research findings using appropriate research methods.
</td></tr>
</table>

	Oral presentation will develop students' presentation skills, and practice their summarizing skills
Reading List and References	**Recommended Readings:** Bell, J. and Waters, S. (2018). *Doing your Research Project*. A Guide for First-time Researchers, 7th Edition, Open University Press, London. Fellows, R. and Liu, A. (2015). *Research Methods for Construction.* 4th Edition, Blackwell, Wiley. Pallant, J. (2010) SPSS survival manual: a step by step guide to data analysis using SPSS, 4th Edition, Open University Press/McGraw-Hill, Maidenhead. Rowntree, D. (2000). *Statistics Without Tears: An Introduction for Non-Mathematicians,* Penguin Science.

Subject Description Form

Subject Code	BRE5751
Subject Title	Strategic Management
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	a. To provide students with in-depth understanding of the subjects relating to strategy and strategic management. b. To develop the students' ability in applying strategic management theories and techniques in practice in the area of construction and real estate.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: a. understand strategy and strategic management; b. possess knowledge in strategic management techniques throughout the development and project cycle; c. apply theories and techniques in practice in the area of strategic management.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	Strategy & strategic management Organization competitiveness Eastern theories on strategy Strategy in a changing world; strategy & leadership Systems Approach to strategic management Tactics and SWOTE Analysis Strategic management in practice; strategy tools Designing organizations and strategies Sustainable development; Sustainability principle, environmental impact, environmental performance assessment and protection. Challenges of major programme management Strategic management in construction; project management: strategic time, cost & quality management Corporate strategy and real estate Risk management, Risk concept, principles of the management of risks, risk management techniques, risk attitude, decision making and application of risk management Quality management, quality management system (QMS)

<table>
<tr><td>Teaching/Learning Methodology
(Note 3)</td><td>Topics are introduced through a study guide and recommended texts supplemented by materials delivered through lectures and seminars. The independent study comprises individual and group work as well as cases for tutorials. Students are part of small study groups who use face-to-face or web-based media to share views and interact with group members.
Face-to-face teaching & learning: Lectures, Tutorials, Seminars and Discussion
Independent study: Assignments (Individual Report) and Guided-study (Cases for discussion and presentation at tutorials)</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td><td></td></tr>
<tr><td>1. Continuous Assessments*</td><td>50%</td><td>√</td><td></td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>• Individual Report</td><td>40%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>• In-class participation</td><td>10%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2. Examination*</td><td>50%</td><td></td><td>√</td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
</table>
*Students are required to pass both the continuous assessment and examination to pass the subject.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Students are required to submit a Term Paper and to demonstrate the ability to apply theory and techniques in practice.
In examination, students are required:
to demonstrate knowledge in strategic management techniques throughout the development and project cycle;
to apply theories and techniques in practice in the area of strategic management.</td></tr>
<tr><td>Reading List and References</td><td><u>Recommended readings</u>:

Evans V (2014) Strategy Tools FT Publishing, Pearson
Galbraith J (2014) Designing Organizations Jossey-bass, Wiley</td></tr>
</table>

	Harvard Business Review *HBR's Must-Reads on Strategy* (Article Collection: Product 12601) Langford D and Male S (2001) *Strategic Management in Construction* Blackwell Science, Oxford Shen, L.Y. Lu W.S and Fan L.C.N. (2009). *Strategic Management*, The Hong Kong Polytechnic University. Sun Tze *The Art of War* (Chinese &/or English Translations) Weatherhead M. (1997) *Real Estate in Corporate Strategy* MacMillan ***Selected journal and conference papers*** CIOB (2014) "*Strategy"* in *Code of Practice for Project Management for Construction and Development* 5th ed. (85-110) John Wiley & Sons. Flanagan, R., Lu, W.S., Shen, L.Y. and Jewell, C. (2007). *Competitiveness in Construction: A Critical Review of Research, Construction Management and Economics*, Vol. 25, 989-1000. Shen L.Y. (1999). 'Risk Management', Building in Value: Pre-design Issues, (Ed., Best & De Valence) Arnold Publishers, ISBN: 0340741600, pp.248-267.

Subject Description Form

Subject Code	EEE5T03
Subject Title	Engineering Ethics and Academic Integrity
Credit Value	1
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of the subject are to: 1. Raise students' awareness of the importance of adhering high standards of academic integrity 2. Enhance students' ability to critically analyse ethical issues and make appropriate ethical decisions.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Demonstrate knowledge and understanding of the concepts and principles of academic integrity and ethics. 2. Demonstrate awareness and ability to analyse academic integrity and ethical issues, such as copyright and plagiarism, and act properly to avoid academic and ethical misbehaviours. 3. Recognise important ethical issues and practices in a university context. 4. Understand the implications and concerns on academic integrity raised by the latest technology, such as ChatGPT and other Generative Artificial Intelligence (GenAI) tools. 5. Identify and deal with complex ethical and professional issues in discipline-specific settings, and be able to communicate effectively the issues to the stakeholders and the public. 6. Critically analyse and discuss problem cases related to engineering ethics and academic integrity.
Subject Synopsis/ Indicative Syllabus	Keyword Syllabus • Introduction to engineering and research ethics – Needs for research ethics to the integrity and well-being of industry, professions, and community; overview of theories and methods in engineering and research ethics. • Ethical issues related to project collaboration, publication, and authorship – Responsibility for quality works; credit and responsibility of project collaborators; citation and acknowledgment; qualifications for authorship; engineering case studies. • Professional and research misconduct – Definition of professional and research misconduct; self-deception in misconduct; factors that undermine integrity; understanding and fostering responsible conduct; engineering case studies.

	• Involving human subjects and animals – The common rule for the protection of human subjects in research and professional functions; responsibility for experimental animals; requirements governing research and professional functions involving human subjects and animals; engineering case studies. • Rights and responsibilities regarding intellectual property – Individual credit and the ownership of innovation; copyrights, "Fair Use," and the Digital Millennium Copyright Act; patents and trade secrets; property rights contrasted with credit for invention; patenting of inventions contrasted with publication of project result; engineering case studies. • Cyber ethics – Common threats to information and systems in the cyberspace; core values of cybersecurity: privacy, security, fairness, and accountability; potential value conflicts and solutions; ethical hacking and concerns; legislative framework: EU Da ta Protection Regulation; engineering case studies. • Ethical use of Generative AI – AI ethics; introduction of Generative AI and its ethical considerations in engineering research and professional functions; AI hallucination; technical efforts in fake, bias, and plagiarism identification; ethical responsibility of developers using generative AI; regulating generative AI and the AI Act; engineering case studies.
Teaching/Learning Methodology	• Lectures: Formal classroom lectures will be given to introduce the concepts of engineering research ethics. Core principles of ethics will be illustrated with engineering cases. They support the intended learning outcomes 1 to 5. Since all lectures are important, students need to achieve 100% attendance in the lectures to pass the subject. • Group discussions and quizzes: During the lecture, students will form groups to analyse and discuss various engineering ethics cases related to the topic of the lecture. Students also need to complete an online quiz after the lecture to show their understanding of the teaching material. They support the intended learning outcomes 1 to 6. • Case study and reflection: Students need to choose one of the problem cases in engineering ethics and academic integrity for in-depth analysis. The analysis result will be shared with other students in a presentation session. Students also need to analyse an ethical problem related to their research project/field of professional work for the reflective study. They support the intended learning outcomes 1 to 6.
Assessment Methods in Alignment with Intended Learning Outcomes	This subject will be assessed on a pass/fail grading system and will not be included in the GPA calculation. To pass the subject, students need to attend all lectures and score 50% or higher in the total marks.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		1	2	3	4	5	6
1. Quizzes	20%	✓	✓	✓	✓	✓	
2. Case study - Presentation	40%	✓				✓	✓
3. Reflective writing	40%	✓				✓	✓
Total	100%						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Quizzes: Students will complete an online quiz after each lecture to show their understanding of the teaching material. They assess the intended learning outcomes 1 to 5.

Case study presentation: The best way to learn engineering ethics and academic integrity is to analyse previous problem cases so that students can learn the lessons from them. A presentation session will be arranged for students to share with other students their analysis results. It assesses the intended learning outcomes 1, 5, and 6.

Reflective writing: To assist students to sink in the discussion in the classes, they are required to submit a reflective report to detail their analysis of an ethical problem related to their research project/field of professional work. It assesses the intended learning outcomes 1, 5, and 6. The reflective writing assignment submissions will be marked by students' supervisors adopting a holistic approach.

Student Study Effort Expected

Class contact:	
▪ Lecture and class activity	13 Hrs.
Other student study effort:	
▪ Self-study and group work	12 Hrs.
▪ Assignment preparation	10 Hrs.
Total student study effort	35 Hrs.

Reading List and References

1. Caroline Whitbeck (2011). *Ethics in Engineering Practice and Research*, Cambridge University Press.
2. Lance Eliot (2023). *Generative AI ChatGPT And AI Ethics*, Lance B. Eliot.
3. Markus Christen, Bert Gordijn, and Michele Loi (2020). *The Ethics of Cybersecurity*, Cham: Springer.
4. Kristin Shrader-Frechette (1994). *Ethics of Scientific Research*, Lanham, Md.: Rowman & Littlefield.
5. University of California, San Diego (UC San Diego). *Resources for Research Ethics Education*, http://research-ethics.net.

Subject Description Form

Subject Code	BRE506
Subject Title	Principles of Project Management
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to enrich students' knowledge and skills in project management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the principles of Project Management Body of Knowledge (PMBOK); b. Learn the skills in managing projects with cross-functional teams and external parties; c. Apply project management techniques at workplaces aiming at shorter lead time, reduced costs, improved quality and enhanced relationship with the concerned parties.
Subject Synopsis/ Indicative Syllabus	**Overview of project management:** characteristics of project; characteristics of project management; defining project management; responsibilities of project managers; meaning of PMBOK. **Project integration management:** definition of integration management; project stakeholders; project objectives and trade-offs; project life cycles; project plan; project execution; overall project change. **Project scope management:** meaning of scope; development of a project charter; scope statement; work breakdown structure (WBS). **Project time / schedule management:** project master schedules; defining activities; estimating activity durations; logic networks; methodology for network analysis; identifying the critical path; schedule control. **Project cost management:** meaning of cost management; process of cost management; resource planning; cost estimating; cost budgeting; cost control; value management. **Project quality management:** source of failure; possible causes for cost related errors; overview of quality management; quality planning; quality assurance; quality control. **Project resource management:** overview of project human resource management; organizational planning; estimating activity resources; staff acquisition; team development. **Project communications management:** general communication concept; process of project communication; best practice for project communication.

	Project risk management: process of project risk management; risk identification; risk quantification; risk response development; risk response control. **Project procurement management:** process of procurement management; procurement planning; solicitation planning; solicitation; source selection; contract administration; contract close-out. **Project stakeholder management:** process of identifying stakeholders; process of planning stakeholder management; process of managing stakeholder engagement; process of controlling stakeholder engagement.
Teaching/Learning Methodology	Lectures and seminars will be run throughout the semester period. A lecture schedule outlining the topics to be discussed throughout the three weekend daytime workshops will be informed to students in the first lecture of the semester. During the lecture period, the lecturers will introduce and discuss the topics, with frequent reference to, and examination of, the recommended textbook, published research papers or other reference materials whenever deemed appropriate. Apart from the face-to-face lecture classes, students are required to form small groups to write a group assignment report based on a set of assigned questions and scenarios in relation to project management in the construction sector or other industry sectors. Students are encouraged to apply their concepts and knowledge learned from the subject, and their hands-on working experience at their workplaces, to tackle the assignment questions. It is the students' ultimate responsibilities to ensure that no plagiarism is committed in their group assignment reports. So students should have checked their works against plagiarism by using some common plagiarism detection and scanning tools (e.g. Turnitin program) before submitting their completed group reports for assessment. Students should submit and retain their "final scanned" electronic copy of their completed group written reports (with the Similarity Index and AI-text Indicators shown) at the same location of the blackboard subject website for perusal and inspection by the subject lecturers. **Honour Declaration Form on the Use of Generative AI (GenAI) Tools in Subject Assignments** **PolyU GenAI App** (source: https://genai.polyu.edu.hk) Students are required to declare the use of any Generative AI (GenAI) tools for brainstorming or generating initial ideas, literature search or writing of assignment reports (e.g. ChatGPT, DeepSeek, Poe, Google Bard, Microsoft 365 Copilot Chat, Qwen 通义千问, etc) in preparing their submitted work, and where and how they have been used. Therefore, students need to submit their completed Honour Declaration Forms (one form for one student for individual assignment whereas one form for one group for group assignment) which should be included at the end of their submitted assignments as a kind of mandatory requirement for perusal and reference by the subject lecturers. If students have adopted AI-generated texts or materials in their work, they must properly cite and reference them in accordance with accepted academic conventions and citation styles. Students may refer to the *Guidelines for Students on the Use of Generative Artificial Intelligence* (source:

	https://www.polyu.edu.hk/ar/students-in-taught-programmes/use-of-genai) developed by the Academic Registry (AR) of PolyU for reference.
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.			
1. Coursework (Individual assignment and Group written report	50%	✓	✓	✓			
2. Examination (2 hours)	50%	✓	✓	✓			
Total	100 %						

Students are required to pass all the specific assessment methods / tasks (**both coursework and examination separately**) in order to pass the whole subject.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Coursework (Individual assignment and Group written report)

The designed individual and group assignment questions are intended to assess the level of students' knowledge and understanding of various underlying functions of project management as defined by the PMBOK Guide used for projects, and then to apply learned knowledge and their hands-on working experience at their workplaces to perform main project management functions on different types of construction projects.

The individual assignment requires students to develop a project plan and schedule for a small wooden house construction project, with emphasis on project description including products, processes and logical sequences, project network diagramming to facilitate the communication of project management in general, and to lay the basis for project planning and scheduling in particular. The group-based assignment requires writing a "method statement" report based on the project information as provided to communicate the project development and construction processes to all the stakeholders while making connections with those relevant basic functions as defined by the Project Management Body of Knowledge (PMBOK) Guide.

Examination (2 hours)

The examination questions attempt to test students' knowledge and understanding of various underlying functions of project management as defined by the PMBOK Guide used for projects, and then to analyze different hypothesized scenarios to provide straight answers or logical arguments by citing relevant both local and international case study projects for proper illustration.

Reading List and References	1. Dennis P. Slevin, David I. Cleland and Jeffrey K. Pinto (2004). *Innovations: Project Management Research*. 2. David I. Cleland and Lewis R. Ireland (2010). *Project Manager's Portable Handbook*, 3rd edition. 3. Development Bureau (2018). *Construction 2.0 - Time to Change*, Report of the Project Cost Management Office, Development Bureau, Hong Kong SAR Government, Hong Kong on the future of the local construction industry - the challenges and how these can be addressed, September, 53 pages (URL: https://www.psgo.gov.hk/en/c20.html). 4. Erling S. Andersen, Kristoffer V. Grude and Tor Haug (2009). *Goal Directed Project Management: Effective Techniques and Strategies*, 4th edition. 5. Frederick Harrison and Dennis Lock (2016). *Advanced Project Management: A Structured Approach*, 4th edition. 6. Gary Heerkens (2006). *The Business-savvy Project Manager: Indispensable Knowledge and Skills for Success* 7. Harold Kerzner (2004). *Advanced Project Management: Best Practices on Implementation*, 2nd edition. 8. Harold Kerzner (2022). *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 13th edition. 9. John M. Nicholas and Herman Steyn (2017). *Project Management for Engineering, Business and Technology*, 5th edition. 10. Paul A. Tedesco (2006). *Common Sense in Project Management*. 11. Project Management Institute (2013). *A Guide to the Project Management Body of Knowledge (PMBOK Guide 2013)*, 5th edition. 12. Project Management Institute (2017). *A Guide to the Project Management Body of Knowledge (PMBOK Guide 2017)*, 6th edition. 13. Project Management Institute (2021). *A Guide to the Project Management Body of Knowledge (PMBOK Guide 2021)*, 7th edition. 14. Rodney J. Turner (2016). *Gower Handbook of Project Management*, 5th edition. 15. Scott Berkun (2005). *The Art of Project Management*. 16. Thomas E. Uher and Martin Loosemore (2004). *Essentials of Construction Project Management*.

Annex 1

Dissertation Handbook (For BRE591 Dissertation)

Notes:

This handbook may be updated from time to time. Students will be informed of the changes as and when appropriate.

BRE591HB (Version_9/2023)

1. Introduction

The dissertation is a very significant component of a Master's programme. It carries a weight equivalent to three or four taught subjects and represents around 420 - 560 hours of student effort.

The dissertation should be an exposition of a student's own work and ideas. Where others have had an input (e.g. in a team situation) this should be clearly identified. Plagiarism is unacceptable. Expulsion may be imposed in cases of proven plagiarism (See Annex One).

Since the subject areas of dissertations are so diverse it is impossible to define a standard approach to content, but included, should be an introduction and definition of objectives, a literature survey, a review of the problem followed by a description of the student's approach to solving the problem, the results or findings, an intellectual analysis of the results or findings, and finally a logical review of the conclusions drawn.

2. The Dissertation Process: Preparation, Progress and Assessment

The procedures for preparing a dissertation can be divided into three different stages. The entire process is summarised in a diagram in Section 7.

Student wishing to write a dissertation proposal must register on the subject BRE591 MSc Dissertation.

BRE587 Research Methods for Construction and Real Estate is the co-requisite/pre-requisite requirement for taking dissertation.

A Dissertation Co-ordinator will be appointed by the Head of Department to co-ordinate students, supervisors and Programme Leaders in the process of dissertation.

2.1. Proposal

2.1.1. Students are expected to learn how to prepare a research proposal in the co-requisite/pre-requisite subject BRE587 Research Methods for Construction and Real Estate. Students may identify a relevant academic supervisor themselves through the list of academic staff published on the BRE's website, or consult the Dissertation Co-ordinator or their Programme Leaders for recommendation. Academic supervisors will be assigned by the Dissertation Co-ordinator if students cannot identify any one themselves. Only student who have registered on BRE591 Dissertation will be assigned supervisors and permitted to submit proposals.

2.1.2. The subject BRE587 Research Methods for Construction and Real Estate enables students to identify and define a problem for valid research, to develop their abilities to identify and evaluate appropriate research methods, and to provide a framework from which students can begin their own research work. The contents will include research methods, research design, analysis of data, presentation of findings, and ethical and legal considerations.

2.1.3. A student is expected to prepare a dissertation proposal in consultation with his/her academic supervisor and submit it no later than the last teaching day of the semester in which the student first registers for dissertation.

2.1.4. The proposal shall be typewritten. When a proposal is not found to be acceptable a student may be requested to resubmit it.

2.1.5. A dissertation proposal should consist of the following:

2.1.5.1. Objectives

2.1.5.2. Content which includes innovative features, challenge, academic value and applicability

2.1.5.3. Methodology

2.1.5.4. References

2.1.5.5. Scheduled programme of work

2.1.5.6. Description of facilities and justification

2.1.5.7. Starting data

2.1.5.8. Expected completion date

2.1.6. Regulations concerning dissertation registration

2.1.6.1. Once a dissertation proposal is approved the student shall proceed at once to carry out the work. The maximum number of dissertation proposals which a student may submit is two.

2.1.6.2. Students should be aware that approval to commence a dissertation is by no means automatic. There will be cases where a student is not permitted to proceed with a dissertation and therefore such student will be required to leave the programme on completion of the requirements for a Postgraduate Diploma award.

2.1.6.3. The normal period for completion of a dissertation is 3 semesters (including summer term). Students are required to pay for all of the 9 credits the dissertation carries in the first semester when he/she enrols on the dissertation. Fees paid will not be refunded even if the student withdraws from his/her dissertation or from the programme during the course of his/her registration. The registration period for the dissertation is set at a maximum of 4 semesters (including summer term) from the date of registration, subject to the regulations on the normal period of registration and subject to satisfactory reports on progress from the academic supervisor. The minimum period for the dissertation work to be completed is unlikely to be less than 1 semester. Break of study is normally not permitted once a student registers for dissertation and students are expected to pursue their dissertation in consecutive semesters.

2.1.6.4. Subject to satisfactory reports on progress from the academic supervisor, students whose dissertation proposal has been approved will continue to register on their dissertation until either the completion of their dissertation or the normal dissertation registration period expires.

2.1.6.5. The student should plan to submit the completed dissertation before the commencement of the examination period of the last semester of the normal period.

2.2. Progress Reports

2.2.1. Students are expected to submit a progress report to their academic supervisor at least once every semester to ensure smooth progress of the dissertation.

2.2.2. Students should inform their academic supervisor immediately when difficulties arise.

2.3. Submission of Dissertation before Assessment

2.3.1. Under normal circumstances, with the agreement of the supervisors, students may prepare for assessment after satisfactory progress.

2.3.2 An electronic copy of the dissertation in Adobe Acrobat PDF format shall be submitted to the academic supervisor.

2.4. Assessment

2.4.1. Oral examination

After receiving the electronic copy of the dissertation from student, the academic supervisor should make arrangement on a mutually convenient time and place for an oral examination.

2.4.2. Assessment panel

The assessment panel will consist of two categories of member, namely:

2.4.2.1. Academic supervisor

2.4.2.2. A moderator to provide quality control.

2.4.2.3. In case the supervisor and the moderator have a very different view on the assessment, the programme leader concerned will make the final decision.

2.4.3. Regulations concerning dissertation assessment

2.4.3.1. After conducting the oral examination the assessment panel will jointly allocate a grade guided by the following weightings which may vary depending on the nature of the project. Individual awards may modify key items and the recommended weightings according to the need of each award.

Progress	Report	Oral	Total
20%	50%	30%	100%

2.4.3.2. The academic supervisor shall write a report on the assessment outcome and forward it to the Dissertation Co-ordinator.

2.4.3.3. Applications to defer submission should NOT normally be considered or approved except under exceptional circumstances such as illness. In such cases, students' applications for deferment of study can be considered.

2.4.3.4. If a student wishes to delay the submission of the completed dissertation beyond the normal period but within the maximum period of 4 semesters (including summer term), he/she may apply on the advice of the supervisor. The application must be endorsed by the relevant Programme Leader and

must be approved by the Chairman of BRE Taught Postgraduate Programme Committee before the end of the examination period of the last semester of the normal period.

2.4.3.5. When permission is granted to extend the dissertation registration beyond the normal period, the student shall be required to pay a fee which is set out in the University's Student Handbook, which shall entitle him/her to register for one additional semester. If the student's study will exceed the normal duration of the programme after extending the dissertation, he/she is also required to apply for extending their study period in the programme.

3. Dissertation Supervision

The amount of effort required by students in the dissertation should clearly be reflected in the quantity and quality of the final submission. In assessing the standard of dissertations supervisors will be seeking to ensure that the student has met with the aims of this part of the programme.

3.1. Role of Academic Supervisor

3.1.1. The student and academic supervisor should contact each other from time to time to discuss progress against his agreed programme. The responsibility for arranging meetings between student and academic supervisor is shared by both parties.

3.1.2. The academic supervisor will advise the student about the style of presentation of the dissertation and the academic supervisor will be available for consultation on a regular basis.

4. Dissertation Moderation

The moderator should ensure that proper procedures are followed and the assessment is consistent.

5. Format and Presentation of Dissertations

5.1. Style

5.1.1. The text shall be placed on one side or both sides, the latter being encouraged wherever possible.

5.1.2. Pagination of the body of the text is to be in Arabic numerals in the upper right hand corner of the page. The pagination begins with the first page of the first chapter and runs through material following the body of the text. Pages with tables, maps, photographs etc. are to be numbered as well.

5.1.3. Pagination of material preceding the body of the text is to be in small Roman numerals.

5.1.4. The body of the text is to be double spaced; footnotes are to be single spaced.

5.1.5. Footnotes shall be placed at the bottom of each page rather than at the end of each chapter or at end of the dissertation. A line shall be drawn beneath the text across the page to separate the text from the footnote. Care should be taken to complete a footnote on the page where it is mentioned in the text, in order to avoid continuing it on the following page. Footnotes may be numbered consecutively through a chapter or start with number one – (1) – on each page, which is the most practical of the two methods of numbering.

5.1.6. Reference shall be presented alphabetically, using the reference citation format for academic journal papers, conference papers, research reports and books in an internationally accepted format used by the discipline in which the study lies. (See Annex One for more advice)

5.1.7. The dissertation shall be submitted on A4 size paper (210 mm x 297mm) of good quality. There shall be a margin (before trimming) of 40mm at the left hand (binding) edge, 25 mm at the top and right margins and 15 mm below the last line of footnotes.

5.1.8. All physical measurements reported in the dissertation shall be in the SI system of units (Systeme Internationale d'Unites). Where, for example, in the review of literature, quantities are expressed in other units, the corresponding SI values should also be quoted.

5.2. Material Preceding Body of Text

5.2.1. A blank sheet.

5.2.2. Title page of dissertation – this shall not be numbered and should be identical with the cover.

5.2.3. Copyright notice (if any)

5.2.4. An abstract of not less than two hundred and not more than five hundred words shall be a part of each dissertation and will contain information on all the substantive features of the work. The top page of each abstract shall contain the following statement:

Abstract of dissertation entitled:

_____

_____

submitted by_____

for the degree of MSc in _____

at The Hong Kong Polytechnic University in (month and year).

5.2.5. Acknowledgements – should be made to supervisors and to persons who have provided special assistance.

5.2.6. A table of contents should be provided which lists the abstract and all main sections thereafter. Material preceding the body of the text shall be paginated using small Roman numerals. Arabic numerals shall be used for the main body of the text.

5.2.7. A list of Illustrative Materials should be provided, if needed. The listing of page references for illustrative materials such as tables, maps and figures will immediately follow the table of contents on a separate page or pages having the same style as the table of content page. Illustrative materials shall have titles and be numbered in Arabic numerals.

5.3. Material Following the Body of the Text. (This shall be numbered in Arabic numerals)

5.3.1. Appendix or appendices

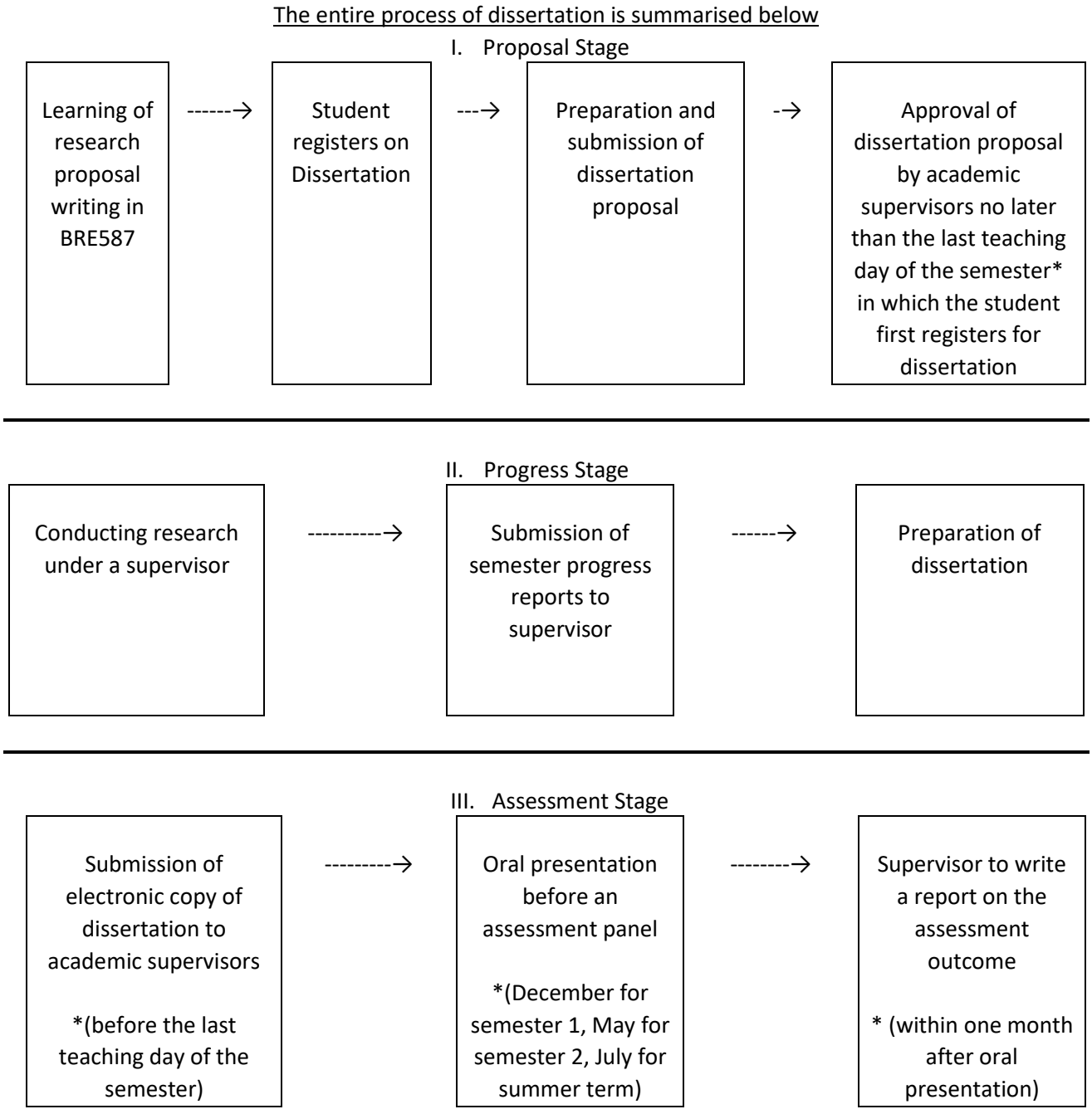
5.3.2. Bibliography

5.3.3. Oversize maps etc. in map pockets

6. Retention of Dissertation

For dissertation which has been graded B+ or above, the electronic copy will be uploaded to BRE website and sent to the University Library for digitisation for permanent retention.

7. Diagram of the Process of Dissertation



* Indicative date

8. Assessment Rubrics for BRE591 Dissertation

1. Assessment Criteria

Elements	Weighting	Criteria
1. Progress	20%	Consultations, diligence, enthusiasm, planning
2. Oral Presentation	30%	Adequacy, structure, clarity, conciseness, graphics
3. Final Dissertation	50%	Adequacy, structure, clarity, originality, length • Presentation • Aim and objectives • Research methodology • Literature review • Data collection & analysis • Conclusions and findings
Total	100%	Overall Component Grade

2. Grading Criteria

Grade	Description	Detail Grading Description
A+	Exceptionally outstanding	The student's work is outstanding. It demonstrates the achievement of all assessment criteria and far exceeds the threshold standard required by the subject area in all regards. The student's work is excellent. It demonstrates the achievement of all assessment criteria and far exceeds the threshold standard required by the subject area in nearly all regards.
A	Outstanding	
A-	Excellent	
B+	Very good	The student's work is very good. It demonstrates the achievement of all assessment criteria and is well above the threshold standard required by the subject area in the majority of regards. The student's work is good. It demonstrates the achievement of all assessment criteria and is well above the threshold standard required by the subject area in all of the assessment criteria.
B	Good	
B-	Wholly good	
C+	Wholly satisfactory	The student's work is wholly satisfactory. It meets the threshold standard required by the subject area in all of the assessment criteria. The student's work is satisfactory. It largely meets the threshold standard required by the subject area in essentially all of the assessment criteria.
C	Satisfactory	
C-	Barely satisfactory	
D+	Barely adequate	The student's work is barely adequate. It fails marginally to meet the threshold standard required by the subject area in a few key assessment criteria. The student's work is weak. It fails marginally to meet the threshold standard required by the subject area in several of the key assessment criteria.
D	Weak	
F	Inadequate	The student's work is inadequate. It fails to meet the threshold standard required by the subject area in many of the assessment criteria OR fails badly to meet some crucial assessment criteria.

Annex 2

Guidance Notes on Avoiding Plagiarism, on Bibliographic Referencing
and on Photocopying of Copyright Materials

The University views plagiarism and copying of copyright materials, without the license of the copyright owner, as a serious disciplinary offence. These guidance notes aim to help students of the University comply with the Institution's policy on plagiarism in continuous assessment, bibliographic referencing and photocopying of copyright materials.

What is plagiarism?

To take (words, ideas, etc.) from someone else's work and use them in one's own work without admitting one has done so.' (*Longman Dictionary of Contemporary English*, 1987)

'.. The action of using or copying someone else's idea or work and pretending that you thought of it or created it.' (*Collins Cobuild English Language Dictionary*, 1987)

'.. The taking and using as one's own of the thoughts, writings, or inventions of another.' (*Shorter Oxford English Dictionary*, 1973)

'To steal or pass off (the ideas or words of another) as one's own: [to] use (a created production) without crediting the source: [to] commit literary theft: [to] present as new and original idea or product derived from an existing source.' (*Webster's Ninth New Collegiate Dictionary*, 1987)

'The appropriation or imitation of another's ideas and manner of expressing them.. to be passed off as one's own.' (*Macquarie Dictionary*, 1985)

The above definitions all suggest that plagiarism involves the idea of intending to plagiarise; it is important to realize that this dishonest intention will be assumed. Excuses such as 'having forgotten' to insert quotation marks, or 'not having remembered' that an idea was someone else's, or 'having thought the reader would understand' that a passage was a paraphrase of someone else's words cannot be accepted. In a similar way, it will be assumed that those who walk out of a shop carrying goods which they have not paid for, and do not intend to pay can be accused of shoplifting.

In short, it is the students' responsibility to avoid any possible suggestion of plagiarism in their work. The golden rule is 'if in doubt, acknowledge' – this should be followed in all 'grey areas', i.e. cases in which you are not sure whether the acknowledgement of a source is necessary or not.

You can visit the website at https://www.polyu.edu.hk/ar/academic-integrity/introduction/ and Student Handbook at https://www.polyu.edu.hk/ar/students-in-taught-programmes/student-handbook/ for more detailed explanations on plagiarism.

How are sources referred to?

There are two ways of referring to a source: by using direct quotations, or by paraphrasing the author's words. Each of these is exemplified below.

Using direct quotations

- A quotation integrated with the text, e.g.

  'The coal reserves,' said Thomas J. Johnson (1982, p.21) 'will not deplete as rapidly as oil reserves,' and this claim is already being borne out by experience.

A quotation presented as in indented paragraph, e.g.

> Conflict within the marketing channel required its own definitions, and one of the first of these was established by Stern and Gorman (1969, p.58). Their view was that a conflict was a process of system changes: '… a change occurs in the task environment or within a channel member's organization that eventually has implications for the channel members… when the other affected members perceive the change as cause of frustration, a conflict situation emerges.'

Note the use of the three-full-stop device (…), separated by one space from the preceding and/or following words, to indicate a word or words have been omitted from the original. (The assumption is, of course, that the omission has not changed the sense of that author's words.)

Secondly, note the use of square brackets, [ ], to indicate that a word has been added or replaced to clarify (but not of course to alter) the author's original meaning, e.g.

Original Registers are, then, types of text, not types of discourse, since they are not defined in terms of what kind of communication they represent.

Quotation '… [registers] are not defined in terms of what kind of communication they represent' (H.G. Widdowson, 1973).

Thirdly, note that where the original itself includes a word or words between inverted commas or quotation marks, a quotation should reproduce this by using double inverted commas between single ones, or vice versa, e.g.

Original One obvious development within a pedagogical grammar would be to use Searle's illocutionary acts to fill in Halliday's "relevant models of language".

Quotation As Widdowson (1973) points out: 'One obvious development within a pedagogical grammar would be to use Searle's illocutionary acts to fill in Halliday's "relevant models of language"', but this suggestion has yet to be followed up. (Alternatively: "…Halliday's relevant models of Language"'

Fourthly, note that italics in the original may be reproduced by underlining in a quotation. If the underlining is not the original's, then this should be made clear. The usual method is to add a note in brackets after the quotation: (my emphasis), (my underlining) or (emphasis added). If one wants to make it quite clear that the emphasis is the original's, one can add: (emphasis as in the original).

Paraphrasing the author's words

Paraphrasing is not simply altering a word here and there, but rather rewording the original – either to shorten/summarize or to expand/clarify. Paraphrasing often leads into 'grey areas' where one may be unsure of whether or not plagiarism could be alleged, so remember the golden rule: 'if in doubt, acknowledge'. In particular, a lengthy piece of paraphrasing (say, several paragraphs) should remind the reader at frequent intervals – at least once per paragraph – of the source.

- Paraphrasing which shortens/summarizes, e.g.

Original 'There are many abusive parents for whom [therapy] groups may be the only answer, not only because of the quality of services offered, or the potential benefits they promise, but chiefly for the fact that a group of this type is the only service that some abusive parents will attend and participate in.' Blizinsky, M. (1982, p.311)

Paraphrase Martin Blizinsky (1982:311) believes that therapy-group sessions may be the only answer for some abusive parents, being the only programme in which they will participate.

- Paraphrasing which expands/clarifies, e.g.

Original 'Although photosynthesis is the principal autotrophic process, chemosynthesis also occurs' (I. Pearson, 1978:135)

Paraphrase As Pearson points out (*English in Biological Sciences*, 1978, p.135), although photosynthesis – the process by which plants make their own food with the help of sunlight – is the major self-feeding process, synthesis involving chemical reactions also takes place.

How to cite bibliographic references
The following guidance notes, which aim to help students with bibliographic referencing, address the question of how, rather than whether, to acknowledge the sources.

Bibliographic references identify the work in question (usually either a book or an article), and give sufficient information on the author, title, publisher and date of publication for this identification to be quite clear and unambiguous. Such references are normally written according to fixed conventions, which it is sensible to follow; one set of these conventions is outlined below.

For books: author's surname first, followed by the initials of his/her other name(s), then by the full title of the book *underlined*; this underlining will be replaced by italics in printed text (as opposed to typescript or handwriting). There then follows the place of publication – usually a city – then the name of the publisher, and lastly the date of publication, e.g.

Crane, D. *Invisible Colleges.* Chicago: University of Chicago Press, 1972.

Where there is more than one author, the examples are:

- Crystal, D. and Davy, D. *Advanced Conversational English*. Harlow: Longman, 1975.
- Brazil. D., Coulthard, M. and Johns, C. *Discourse Intonation and language Teaching.* Harlow: Longman, 1980.

Where the book is a collection (of articles or monographs) rather than a single text, the examples are:

- Pride, J.B. ed. *Sociolinguistic Aspects of Language Learning and Teaching .* Oxford: Oxford University Press, 1979
- Richards, J.C. and Nunan, D. eds. *Second Language Teacher Education*. Cambridge: Cambridge University Press, 1990.

For articles in a collection: similar to book references, but the author and title of the article come first, e.g.

Penninton, M.C. A professional development focus for the language teaching practicum. In Richards, J.C. and Nunan, D. eds. *Second Language Teacher Education*. Cambridge: Cambridge University Press, 1990.

For articles in a journal (serial) : much as above, except that information on the journal replaces that on the book (collection), e.g.

Stieg, M.F. The information needs of Historians. *College and Research Libraries,* 1981, 42(6), 549-560.

The figures ‘42(6)’ mean ‘volume 42, no.6’; the figures ‘549-560’ mean ‘pages 549 to 560’. Note also that capital letters are not usual in the titles of articles (though in those of books, of course, they are).

Bibliographic references can be placed as footnotes to the text, or far better, listed alphabetically (by author) in a ‘bibliography’ at the end of the text. If a bibliography is used, references in the text need only state the author(s) and the publication date, e.g. Conflict within the marketing channel required its own definitions, and one of the first of these was established by Stern and Gorman (1969).

If the bibliography contains two or more publications by the same author(s) in the same year, identify them as 1969a, 1969b, etc.

If the text does make references to books/articles in this way, then the bibliography should put the publication date after the author’s name, rather than at the end, e.g.

Crane. D., 1972. *Invisible Colleges.* Chicago: University of Chicago Press.

Finally, minor differences from the above conventions may be found, as between one published bibliography and another, but these are unimportant; what does matter is that consistency in following one set of conventions is ensured. Not only should the information in the bibliography be correct in every detail (author’s name and initials, publisher’s name, etc.), complete typographical accuracy – spacing, punctuation, etc. is also very important. Thorough proofreading is essential here, as in the rest of the text, and is a measure of the care that have been taken; conversely, a text full of ‘typos’ (typographical errors), misspellings, inconsistencies, etc. is not only evidence of carelessness but also very irritating for the audience – the reader – and thus obviously counter-productive.

Photocopying of Copyright Materials
The University considers the protection of intellectual property as a serious matter and copying of copyright materials, without the licence of copyright owner, may be regarded as a statutory offence. Students should comply with the Copyright Ordinance then prevailing at all times.

Under the Copyright Ordinance, a copyright in a work is infringed by a person who, without the licence of the copyright owner, among other things, copies the work, issues or makes available copies of the work to the public. Copying of a work means reproducing the work in any material form, including storing the work in any medium by electronic means. Making copies of the work available to public includes putting it on the internet.

Any printed material in book or volume form which carries a claim to copyright either on the reverse side of the title page, or next to it, is copyright protected. All materials in all periodicals are normally presumed to be copyright protected.

Under Hong Kong Law:

- A person who, without the licence of the copyright owner sells, offers for sale or distributes an infringing copy of the work for the purpose of trade or business commits an offence punishable by a fine of HK$50,000.00 in respect of each infringing copy and imprisonment for 4 years, the person is also subject to action for damage (or for handing over the profits) by the copyright owner.

- It is also an offence if a person who, without the licence of the copyright owner, distributes otherwise than for the purpose of trade or business to such an extent as to affect prejudicially the owner of the copyright, an infringing copy of a copyright work, the person will also be liable in the same way as mentioned above.

There are certain acts permitted in relation to copyright works. In general, fair dealing with work of any description for the purposes of research or private student does not infringe any copyright in the work.

Librarian of a “specified library” may, if the prescribed conditions are complied with:

(i) Make and supply a copy of an article in a periodical without infringing any copyright in the text; Or
(ii) Make and supply from a published edition a copy of part of any other work.

The prescribed conditions include the following:

- That copies are supplied only to persons satisfying the Librarian that they require them for purposes of research or private study, and will not use them for any other purpose;

- That (i) no person is furnished with more than one copy of the same article or with copies of more than one article contained in the same issue of a periodical; or (ii) a copy of more than a reasonable proportion of any other work; and

- That persons to whom copies are supplied are required to pay for them a sum not less than the cost attributable to their production.

Every person to whom a copy is supplied must personally sign a declaration (a stamped or typed signature, or the signature of an agent is not sufficient) available at Library counters.