



THE HONG KONG POLYTECHNIC UNIVERSITY
DEPARTMENT OF BUILDING AND REAL ESTATE

Programme Document
for
BRE Research Programmes
(for research students admitted in 2017/18 or after)

June 2017

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**DEPARTMENT OF BUILDING & REAL ESTATE
PROGRAMME DOCUMENT FOR RESEARCH DEGREE PROGRAMMES**

(for research students admitted in 2017/18 or after)

Programme Title :	<p>Doctor of Philosophy (PhD) in Information and Construction Technology</p> <p>Doctor of Philosophy (PhD) in Construction and Real Estate Economics</p> <p>Doctor of Philosophy (PhD) in Urban Sustainability Policy</p> <p>Doctor of Philosophy (PhD) in Construction and Real Estate Management</p> <p>Master of Philosophy (MPhil) in Information and Construction Technology</p> <p>Master of Philosophy (MPhil) in Construction and Real Estate Economics</p> <p>Master of Philosophy (MPhil) in Urban Sustainability Policy</p> <p>Master of Philosophy (MPhil) in Construction and Real Estate Management</p>
Programme offering department :	Department of Building and Real Estate
Award :	<p>Doctor of Philosophy (PhD)</p> <p>Master of Philosophy (MPhil)</p>
Normal length of programme	<p>MPhil : 2 years (full-time)</p> <p>PhD : 3 years (full-time)</p> <p>4 years (full-time)</p> <p><i>The normal study period for part-time mode of study will be twice the length of the full-time mode.</i></p>
Programme Structure	<p>2-year MPhil : 9 credits (<i>1 credit from HTI6081 + 2 credits from attending seminars + 6 credits from other subjects under the prescribed curriculum</i>) <u>plus</u> a MPhil thesis</p>

3-year PhD : 15 credits (*1 credit from HTI6081 + 3 credits from attending seminars + 2 credits from practicum + 9 credits from other subjects under the prescribed curriculum*) plus a PhD thesis

4-year PhD : 22 credits (*1 credit from HTI6081 + 4 credits from attending seminars + 2 credits from practicum + 15 credits from other subjects of which no more than 6 credits on Guided-study subjects under the prescribed curriculum*) plus a PhD thesis

HTI6081 is a compulsory one-credit subject entitled “*Ethics : Research, Professional & Personal Perspectives*”.

Students are recommended to complete one credit for attending seminars per year (for full-time students) or per two years (for part-time students) to fulfil the above-mentioned requirement, with an overall assessment grade of Pass and Fail. However, as deemed appropriate by the Chief Supervisor, they are allowed to complete at most two credits per year (for full-time students) or per two years (for part-time students) to fulfil the research seminar credit requirement.

For Practicums, students are allowed to complete these two credits any time before they graduate. They can choose to complete these two credits in two different semesters or within the same semester, subject to the approval of the Chief Supervisor. Stipend recipients are allowed to fulfill part of their departmental training requirement through the completion of these compulsory training credits. For students who are required to undertake teaching supporting activities, they should be required to complete the training programmes organised by the EDC and ELC before the commencement of any teaching supporting activities.

Students can take research postgraduate subjects (3 credits) provided by other departments at PolyU or other universities as elective subjects to fulfill the elective requirement, subject to the endorsement of the Chief

	Supervisor and approval of the Departmental Research Committee on a case-by-case basis.
Credit Transfer	<p>Credits which have already been used to contribute to an award should not be “transferred” to contribute to another award with the following exceptions:</p> <p>3-year PhD students will be allowed to apply to transfer one credit from their previous studies in HTI6081 and one credit from their previous attendance in seminars.</p>

This Programme Document is subject to review and changes which BRE can decide to make from time to time. Students will be informed of the changes as and when appropriate.

This Document should be read together with the “Regulations and Administrative Procedures for the Degrees of MPhil and PhD” and the “Research Student Handbook”.

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: MPhil in Information and Construction Technology

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ol style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in information and construction technology; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Understand the importance and strategic values of their research; 4. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory

Curriculum Map for Individual Research Degree Programme

Programme Title: MPhil in Information and Construction Technology

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Thesis
1. Develop a systematical understanding of advanced knowledge in information and construction technology;		√			√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√			√
3. Understand the importance and strategic values of their research;	√	√	√	√	√
4. Develop effective communication skills for both academic and non-academic communities	√	√	√	√	√

Subject #1 – CE620 Research Methods (3 credits)

Subject #2 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #3 – HTI6081 Ethics: Research, Professional & Personal Perspective (1 credit)

Subject #4 – BRE671 & BRE672 - Attendance in research seminars/workshops/conferences (total 2 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: MPhil in Construction and Real Estate Economics

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ul style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>Upon completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in construction and real estate economics; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Understand the importance and strategic values of their research; 4. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory

Curriculum Map for Individual Research Degree Programme

Programme Title: MPhil in Construction and Real Estate Economics

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate economics;	√				√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√			√	√
3. Understand the importance and strategic values of their research;	√	√	√	√	√
4. Develop effective communication skills for both academic and non-academic communities		√	√		√

Subject #1 – CE620 Research Methods (3 credits)

Subject #2 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #3 – HTI6081 Ethics: Research, Professional & Personal Perspective (1 credit)

Subject #4 – BRE671 & BRE672 – Practicum (total 2 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: MPhil in Urban Sustainability Policy

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <p>a. acquire competence in research methods and scholarship; and</p> <p>b. display sustained independent effort and independent original thought.</p> <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in urban sustainability policy; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Understand the importance and strategic values of their research; 4. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory

Curriculum Map for Individual Research Degree Programme

Programme Title: MPhil in Urban Sustainability Policy

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Thesis
1. Develop a systematical understanding of advanced knowledge in Urban Sustainability Policy ;		√			√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√			√
3. Understand the importance and strategic values of their research; 4.	√	√	√	√	√
5. Develop effective communication skills for both academic and non-academic communities	√	√	√	√	√

Subject #1 – CE620 Research Methods (3 credits)

Subject #2 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #3 – HTI6081 Ethics: Research, Professional & Personal Perspective (1 credit)

Subject #4 – BRE671 & BRE672 - Attendance in research seminars/workshops/conferences (total 2 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: MPhil in Construction and Real Estate Management

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ul style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in construction and real estate management; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Understand the importance and strategic values of their research; 4. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory

Curriculum Map for Individual Research Degree Programme

Programme Title: MPhil in Construction and Real Estate Management

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate management;				√	√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√				√
3. Understand the importance and strategic values of their research; 4.	√	√	√		√
5. Develop effective communication skills for both academic and non-academic communities		√	√		√

Subject #1 – CE620 Research Methods (3 credits)

Subject #2 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #3 – HTI6081 Ethics: Research, Professional & Personal Perspective (1 credit)

Subject #4 – BRE671 & BRE672 - Attendance in research seminars/workshops/conferences (total 2 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: PhD in Information and Construction Technology

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme*
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ul style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in information and construction technology; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Develop the ability to solve challenging problems related to information and construction technology; 4. Understand the importance and strategic values of their research; 5. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Programme Title: PhD in Information and Construction Technology (3 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Programme Title: PhD in Information and Construction Technology (4 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory

BRE674	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
B-1 Guided Study Subjects			
BRE6801	Guided Study in Building and Real Estate II (Land Use & Planning)	3	Departmental Subject
BRE6805	Guided Study in Construction Information Technology	3	Departmental Subject
B-2 Other Subjects			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Information and Construction Technology (3 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Thesis
1. Develop a systematical understanding of advanced knowledge in information and construction technology;	√		√				√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√	√				√
3. Develop the ability to solve challenging problems related to information and construction technology;	√		√				√
4. Understand the importance and strategic values of their research;		√	√	√	√	√	√
5. Develop effective communication skills for both academic and non-academic communities		√	√	√	√	√	√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672 & BRE673 - Attendance in research seminars/workshops/conferences (Total 3 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Information and Construction Technology (4 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Thesis
1. Develop a systematical understanding of advanced knowledge in information and construction technology;	√		√				√	√	√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√	√				√	√	√
3. Develop the ability to solve challenging problems related to information and construction technology;	√		√				√	√	√
4. Understand the importance and strategic values of their research;		√	√	√	√	√			√
5. Develop effective communication skills for both academic and non-academic communities		√	√	√	√	√			√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672, BRE673 & BRE674 - Attendance in research seminars/workshops/conferences (Total 4 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Subject #7 & #8 – BRE6801 & BRE6805 – Guided study (total 6 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: PhD in Construction and Real Estate Economics

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ol style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>Upon completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in construction and real estate economics; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Develop the ability to solve challenging problems related to construction and real estate economics; 4. Understand the importance and strategic values of their research; 5. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Programme Title: PhD in Construction and Real Estate Economics (3 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Programme Title: PhD in Construction and Real Estate Economics (4 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE674	Attendance in research seminars/workshops/conferences	1	University Compulsory

BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
B-1 Guided Study Subjects			
BRE6801	Guided Study in Building and Real Estate II (Land Use & Planning)	3	Departmental Subject
BRE6805	Guided Study in Construction Information Technology	3	Departmental Subject
B-2 Other Subjects			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Programme Title: PhD in Information and Construction Technology (4 years)
Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Construction and Real Estate Economics (3 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate economics;	√	√					√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√			√	√	√
3. Develop the ability to solve challenging problems related to construction and real estate economics;	√	√			√	√	√
4. Understand the importance and strategic values of their research;			√	√			√
5. Develop effective communication skills for both academic and non-academic communities			√	√			√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672 & BRE673 - Attendance in research seminars/workshops/conferences (Total 3 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Construction and Real Estate Economics (4 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate economics;	√	√					√	√	√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√			√	√	√	√	√
3. Develop the ability to solve challenging problems related to construction and real estate economics;	√	√			√	√	√	√	√
4. Understand the importance and strategic values of their research;			√	√					√
5. Develop effective communication skills for both academic and non-academic communities			√	√					√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672, BRE673 & BRE674 - Attendance in research seminars/workshops/conferences (Total 4 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Subject #7 & #8 – BRE6801 & BRE6805 – Guided study (total 6 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: PhD in Urban Sustainability Policy

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ul style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in urban sustainability policy; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Develop the ability to solve challenging problems related to urban sustainability policy; 4. Understand the importance and strategic values of their research; 5. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Programme Title: PhD in Urban Sustainability Policy (3 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Compulsory Subject			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Programme Title: PhD in Urban Sustainability Policy (4 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory

BRE674	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
B-1 Guided Study Subjects			
BRE6801	Guided Study in Building and Real Estate II (Land Use & Planning)	3	Departmental Subject
BRE6805	Guided Study in Construction Information Technology	3	Departmental Subject
B-2 Other Subjects			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Urban Sustainability Policy (3 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Thesis
1. Develop a systematical understanding of advanced knowledge in Urban Sustainability Policy ;	√			√			√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√		√			√
3. Develop the ability to solve challenging problems related to Urban Sustainability Policy ;	√			√			√
4. Understand the importance and strategic values of their research;		√	√	√	√	√	√
5. Develop effective communication skills for both academic and non-academic communities		√	√	√	√	√	√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672 & BRE673 - Attendance in research seminars/workshops/conferences (Total 3 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Urban Sustainability Policy (4 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Thesis
1. Develop a systematical understanding of advanced knowledge in Urban Sustainability Policy ;	√		√				√	√	√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√	√				√	√	√
3. Develop the ability to solve challenging problems related to Urban Sustainability Policy ;	√		√				√	√	√
4. Understand the importance and strategic values of their research;		√	√	√	√	√			√
5. Develop effective communication skills for both academic and non-academic communities		√	√	√	√	√			√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672, BRE673 & BRE674 - Attendance in research seminars/workshops/conferences (Total 4 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Subject #7 & #8 – BRE6801 & BRE6805 – Guided study (total 6 credits)

Mapping of Intended Learning Outcome of Individual Research Degree Programme against the University Overarching Aims of Research Degree Programmes

Programme Title: PhD in Construction and Real Estate Management

Hosted by: Department of Building and Real Estate

University Overarching Aims of Research Degree Programmes	Intended Learning Outcomes of Individual Research Degree Programme *
<p>The research degree programmes are designed in such a way to enable the student to:</p> <ul style="list-style-type: none"> a. acquire competence in research methods and scholarship; and b. display sustained independent effort and independent original thought. <p>The PhD programmes should target to produce academics or industrial R & D professionals.</p>	<p>On the completion of the program, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop a systematical understanding of advanced knowledge in construction and real estate management; 2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods; 3. Develop the ability to solve challenging problems related to construction and real estate management; 4. Understand the importance and strategic values of their research; 5. Develop effective communication skills for both academic and non-academic communities

Coursework Requirement for Outcome-based Programmes

Programme Title: PhD in Construction and Real Estate Management (3 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Compulsory Subject			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Programme Title: PhD in Construction and Real Estate Management (4 years)

A. List of Compulsory Subjects			
Subject Code	Subject Title	Credit Value	Subject Type
CE620	Research Methods	3	Faculty Compulsory
CE603	Research Frontier in Construction and Environment	3	Faculty Compulsory
HTI6081	Ethics: Research, Professional and Personal Perspectives	1	University Compulsory
BRE671	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE672	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE673	Attendance in research seminars/workshops/conferences	1	University Compulsory
BRE674	Attendance in research seminars/workshops/conferences	1	University Compulsory

BRE675	Practicum	1	University Compulsory
BRE676	Practicum	1	University Compulsory
B. List of Elective Subject			
B-1 Guided Study Subjects			
BRE6801	Guided Study in Building and Real Estate II (Land Use & Planning)	3	Departmental Subject
BRE6805	Guided Study in Construction Information Technology	3	Departmental Subject
B-2 Other Subjects			
BRE666	Numerical Methods for Engineers	3	Departmental Subject

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Construction and Real Estate Management (3 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate management;	√				√		√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√				√	√
3. Develop the ability to solve challenging problems related to construction and real estate management;	√						√
4. Understand the importance and strategic values of their research;		√	√	√			√
5. Develop effective communication skills for both academic and non-academic communities			√	√			√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

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Subject #5 – BRE671, BRE672 & BRE673 - Attendance in research seminars/workshops/conferences (Total 3 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Curriculum Map for Individual Research Degree Programme

Programme Title: PhD in Construction and Real Estate Management (4 years)

Hosted by: BRE

Please put a “√” in the relevant box where the subject helps to fulfill the specific programme outcome.

Programme Outcomes	Subject #1	Subject #2	Subject #3	Subject #4	Subject #5	Subject #6	Subject #7	Subject #8	Thesis
1. Develop a systematical understanding of advanced knowledge in construction and real estate management;	√				√		√	√	√
2. Develop scientific literacy, including critical thinking, analytical skills, and sound research methods;	√	√				√	√	√	√
3. Develop the ability to solve challenging problems related to construction and real estate management;	√						√	√	√
4. Understand the importance and strategic values of their research;		√	√	√					√
5. Develop effective communication skills for both academic and non-academic communities			√	√					√

Subject #1 – BRE666 Numerical Methods for Engineers (3 credits)

Subject #2 – CE620 Research Methods (3 credits)

Subject #3 – CE603 Research Frontier in Construction and Environment (3 credits)

Subject #4 – HTI6081 Ethics: Research, Professional & Personal Perspectives (1 credit)

Subject #5 – BRE671, BRE672, BRE673 & BRE674 - Attendance in research seminars/workshops/conferences (Total 4 credits)

Subject #6 – BRE675 & BRE676 - Practicum (Total 2 credits)

Subject #7 & #8 – BRE6801 & BRE6805 – Guided study (total 6 credits)

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	BRE666
Subject Title	Numerical Methods for Engineers
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to provide students the basic concepts, methodologies and skills of solving engineering problems numerically with computers;
Intended Learning Outcomes (Note 1)	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> a. find the root of an equation by bisection method and Newton-Raphson method; b. solve algebraic equations by Gauss elimination, LU decomposition and matrix inversion, Gauss-Seidel iteration method; c. apply least-squares regression and interpolating polynomials for curve-fitting and plotting experimental data; d. apply Newton-Cotes integration formulas for numerical integration and finite difference method for numerical differentiation; e. apply finite difference methods for solving ordinary and partial differential equations, including Euler's method, Runge-Kutta method, and Crank-Nicolson method. f. apply statistical methods for data analysis
Subject Synopsis/ Indicative Syllabus (Note 2)	<p>Introduction to Numerical and Statistical Methods</p> <p>Roots of non-linear equations – Bracketing method. Bisection method. Open methods. Newton-Raphson method. Secant method. Brent's method.</p> <p>Linear algebraic equations – Gauss elimination. LU Decomposition and Matrix Inversion. Gauss-seidel iteration.</p> <p>Curve fitting and interpolating – Least square regression. Linear regression. Polynomial regression. Nonlinear regression. Interpolation. Lagrange interpolating polynomials. Newton's divided-difference interpolating polynomials. Spline interpolation.</p> <p>Numerical integration and differentiation – Newton-Cotes integration formulas. Trapezoidal rule. Simpson's rules. Romberg integration. Taylor's series expansion. Richardson extrapolation.</p> <p>Differential equations – Euler's method. Runge-Kutta method. Systems of equations. General methods for boundary-value problems. The shooting method. Finite difference method; Explicit methods. Crank-Nicolson method. Alternating-direction implicit (ADI) scheme.</p> <p>Statistical methods for Building Engineers, Surveyors and Project Managers - Elementary measurements of central tendency and dispersions; Probability and probability distributions; Collection of data, sampling, sampling distributions</p>

	<p>Estimation and hypothesis testing; Goodness of fit and testing of independence Simple and multiple regression;</p> <p>Software application: SPSS</p>																																								
<p>Teaching/Learning Methodology (Note 3)</p>	<p>Teaching periods will adopt a range of methods which include lectures and tutorials. The lectures aim to provide the students fundamental concepts and principles of numerical methods. Tutorial will be used to develop students' problem solving skills. Where appropriate, the use of computer assisted learning techniques will be employed.</p> <p>The intention is to create an environment that encourages active learning. Students will be encouraged to apply the numerical techniques to solve practical engineering problems.</p>																																								
<p>Assessment Methods in Alignment with Intended Learning Outcomes (Note 4)</p>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> </tr> </thead> <tbody> <tr> <td>1. Coursework</td> <td>50</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> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Examination and coursework will constitute 50% and 50% of the overall work of the subject respectively. The coursework mark will be based on the assessments of assignments, problem solving projects, and in-class mid-term test. Assessment methods are intended to ensure the students achieve the learning objectives.</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					a	b	c	d	e	1. Coursework	50	√	√	√	√	√	2. Examination	50	√	√	√	√	√								Total	100 %					
Specific assessment methods/tasks	% weighting			Intended subject learning outcomes to be assessed (Please tick as appropriate)																																					
		a	b	c	d	e																																			
1. Coursework	50	√	√	√	√	√																																			
2. Examination	50	√	√	√	√	√																																			
Total	100 %																																								
<p>Student Study Effort Expected</p>	<table border="1"> <thead> <tr> <th>Class contact:</th> <th>Hours/week x weeks</th> </tr> </thead> <tbody> <tr> <td>▪ Lectures</td> <td>2 x 13 = 26 Hrs</td> </tr> <tr> <td>▪ Tutorials</td> <td>1 x 13 = 13 Hrs.</td> </tr> <tr> <td>Other student study effort:</td> <td></td> </tr> <tr> <td>▪ Computer simulations and results analysis</td> <td>6 x 7 = 42 Hrs.</td> </tr> <tr> <td>▪ Self-study</td> <td>3 x 13 = 39 Hrs.</td> </tr> <tr> <td>Total student study effort</td> <td>120 Hrs.</td> </tr> </tbody> </table>	Class contact:	Hours/week x weeks	▪ Lectures	2 x 13 = 26 Hrs	▪ Tutorials	1 x 13 = 13 Hrs.	Other student study effort:		▪ Computer simulations and results analysis	6 x 7 = 42 Hrs.	▪ Self-study	3 x 13 = 39 Hrs.	Total student study effort	120 Hrs.																										
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<p>Reading List and References</p>	<ol style="list-style-type: none"> 1. S.C. Chapra and R.R. Canale, Numerical Methods for Engineers, McGraw-Hill, 2006. 2. J. Kiusalaas, Numerical Methods in Engineering with MATLAB, Cambridge University Press, 2010. 3. W. Dos Passos, Numerical methods, algorithms, and tools in C#, CRC press, 2010. 4. D.R. Durran, Numerical Methods for Fluid Dynamics: with Applications to Geophysics, New York, Springer, 2010. 5. D.F. Griffiths, D.J. Higham, Numerical Methods for Ordinary Differential Equations: Initial Value Problems, London, New York, Springer, 2010. 6. B.C. Cronk, <i>How to use SPSS: a step-by-step guide to analysis and interpretation</i>. Pyrczak Publishing, 2008 																																								

	<p>7. Francis Bacon in <i>Stanford Encyclopedia of Philosophy</i>. Edited by Zalta, E.N.</p> <p>8. D.B. Levine, D.F. Stephan, T.C. Krehbiel, M.L. Berenson, <i>Statistics for Managers using Microsoft Excel</i>. Pearson. 2011.</p> <p>9. D.P. Lindstrom (ed.) <i>Schaum's easy outlines in statistics</i>. McGraw Hill. 2002.</p> <p>10. E.M. Phillips, D.S. Pugh, <i>How to get a PhD</i>. Open University Press. 2010.</p> <p>11. K.R. Popper, <i>The logic of scientific discovery</i>. Hutchinson. 1968.</p>
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Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE671
Subject Title	Attendance in research seminars/workshops/conferences
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure and horizon of the students in research and other related areas.
Intended Learning Outcomes	Understand the importance and strategic value of research and development. Develop effective communication skills for both academic and non-academic communities.
Subject Synopsis/ Indicative Syllabus	<p>Full-time students are required to attend at least 10 research seminars per academic year, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars every year.</p> <p>Part-time students are required to attend at least 10 research seminars per two academic years, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars once every two academic years.</p> <p>The research seminars may or may not be organised by BRE Department and are expected to last not less than an hour each. The topic of the seminar reported on should not be related directly to the thesis title of the student.</p>
Assessment Methods	<p>Chief Supervisors are required to assess the report (with a pass or failure grade). Students who failed to submit a report to the satisfaction of their Chief Supervisor are required to make a re-submission until a pass grade is obtained. The Chief Supervisor has to pass the record of the seminars attended by their students and the report with a pass grade to the Research Office for custody at the end of each academic year.</p> <p>Students are recommended to complete one credit for attending seminars per year (for full-time students) or per two years (for part-time students) to fulfil the above-mentioned requirement, with an overall assessment grade of Pass and Fail. However, as deemed appropriate by the Chief Supervisor, they are allowed to complete at most two credits per year (for full-time students) or per two years (for part-time students) to fulfil the research seminar credit requirement.</p>

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE672
Subject Title	Attendance in research seminars/workshops/conferences
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure and horizon of the students in research and other related areas.
Intended Learning Outcomes	Understand the importance and strategic value of research and development. Develop effective communication skills for both academic and non-academic communities.
Subject Synopsis/ Indicative Syllabus	<p>Full-time students are required to attend at least 10 research seminars per academic year, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars every year.</p> <p>Part-time students are required to attend at least 10 research seminars per two academic years, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars once every two academic years.</p> <p>The research seminars may or may not be organised by BRE Department and are expected to last not less than an hour each. The topic of the seminar reported on should not be related directly to the thesis title of the student.</p>
Assessment Methods	<p>Chief Supervisors are required to assess the report (with a pass or failure grade). Students who failed to submit a report to the satisfaction of their Chief Supervisor are required to make a re-submission until a pass grade is obtained. The Chief Supervisor has to pass the record of the seminars attended by their students and the report with a pass grade to the Research Office for custody at the end of each academic year.</p> <p>Students are recommended to complete one credit for attending seminars per year (for full-time students) or per two years (for part-time students) to fulfil the above-mentioned requirement, with an overall assessment grade of Pass and Fail. However, as deemed appropriate by the Chief Supervisor, they are allowed to complete at most two credits per year (for full-time students) or per two years (for part-time students) to fulfil the research seminar credit requirement.</p>

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE673
Subject Title	Attendance in research seminars/workshops/conferences
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure and horizon of the students in research and other related areas.
Intended Learning Outcomes	Understand the importance and strategic value of research and development. Develop effective communication skills for both academic and non-academic communities.
Subject Synopsis/ Indicative Syllabus	<p>Full-time students are required to attend at least 10 research seminars per academic year, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars every year.</p> <p>Part-time students are required to attend at least 10 research seminars per two academic years, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars once every two academic years.</p> <p>The research seminars may or may not be organised by BRE Department and are expected to last not less than an hour each. The topic of the seminar reported on should not be related directly to the thesis title of the student.</p>
Assessment Methods	<p>Chief Supervisors are required to assess the report (with a pass or failure grade). Students who failed to submit a report to the satisfaction of their Chief Supervisor are required to make a re-submission until a pass grade is obtained. The Chief Supervisor has to pass the record of the seminars attended by their students and the report with a pass grade to the Research Office for custody at the end of each academic year.</p> <p>Students are recommended to complete one credit for attending seminars per year (for full-time students) or per two years (for part-time students) to fulfil the above-mentioned requirement, with an overall assessment grade of Pass and Fail. However, as deemed appropriate by the Chief Supervisor, they are allowed to complete at most two credits per year (for full-time students) or per two years (for part-time students) to fulfil the research seminar credit requirement.</p>

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE674
Subject Title	Attendance in research seminars/workshops/conferences
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure and horizon of the students in research and other related areas.
Intended Learning Outcomes	Understand the importance and strategic value of research and development. Develop effective communication skills for both academic and non-academic communities.
Subject Synopsis/ Indicative Syllabus	<p>Full-time students are required to attend at least 10 research seminars per academic year, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars every year.</p> <p>Part-time students are required to attend at least 10 research seminars per two academic years, in addition to workshops/conferences, and to submit a report, to the Chief Supervisor, of no less than 1,500 words (excluding references) on one of the attended seminars once every two academic years.</p> <p>The research seminars may or may not be organised by BRE Department and are expected to last not less than an hour each. The topic of the seminar reported on should not be related directly to the thesis title of the student.</p>
Assessment Methods	<p>Chief Supervisors are required to assess the report (with a pass or failure grade). Students who failed to submit a report to the satisfaction of their Chief Supervisor are required to make a re-submission until a pass grade is obtained. The Chief Supervisor has to pass the record of the seminars attended by their students and the report with a pass grade to the Research Office for custody at the end of each academic year.</p> <p>Students are recommended to complete one credit for attending seminars per year (for full-time students) or per two years (for part-time students) to fulfil the above-mentioned requirement, with an overall assessment grade of Pass and Fail. However, as deemed appropriate by the Chief Supervisor, they are allowed to complete at most two credits per year (for full-time students) or per two years (for part-time students) to fulfil the research seminar credit requirement.</p>

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE675
Subject Title	Practicum
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure of the students in teaching and academic supporting activities.
Intended Learning Outcomes	Develop effective teaching, communication and organisation skills.
Subject Synopsis/ Indicative Syllabus	<p>As part of the programme requirement, all PhD students who are not provided with the TPS Assistantship, irrespective of funding source and mode of study, must complete two training credits before graduation.</p> <p>To earn one credit, students will be required to engage in teaching/research supporting activities assigned by the head of Department or his/her delegate for 6 hours/week in any 13-week semester.</p> <p>Students are allowed to complete these two credits any time before they graduate. They can choose to complete these two credits in two different semesters or within the same semester, subject to the approval of the Chief Supervisor. Stipend recipients are allowed to fulfil part of their Practicum requirement through the completion of these compulsory training credits.</p> <p>For students who are required to undertake teaching supporting activities, they should be required to complete the training programmes organised by the EDC and ELC before the commencement of any teaching supporting activities.</p>
Assessment Methods	<p>Chief Supervisors are required to :</p> <ol style="list-style-type: none"> a. Ensure that the activities are structured with proper assessment and b. Submit, at the end of the training session, an assessment report on the performance of the student, with details of activities undertaken and an overall grade of Pass <u>or</u> Fail.

The Hong Kong Polytechnic University

Subject Description Form

Subject Code	BRE676
Subject Title	Practicum
Credit Value	1
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To enhance the exposure of the students in teaching and academic supporting activities.
Intended Learning Outcomes	Develop effective teaching, communication and organisation skills.
Subject Synopsis/ Indicative Syllabus	<p>As part of the programme requirement, all PhD students who are not provided with the TPS Assistantship, irrespective of funding source and mode of study, must complete two training credits before graduation.</p> <p>To earn one credit, students will be required to engage in teaching/research supporting activities assigned by the head of Department or his/her delegate for 6 hours/week in any 13-week semester.</p> <p>Students are allowed to complete these two credits any time before they graduate. They can choose to complete these two credits in two different semesters or within the same semester, subject to the approval of the Chief Supervisor. Stipend recipients are allowed to fulfil part of their Practicum requirement through the completion of these compulsory training credits.</p> <p>For students who are required to undertake teaching supporting activities, they should be required to complete the training programmes organised by the EDC and ELC before the commencement of any teaching supporting activities.</p>
Assessment Methods	<p>Chief Supervisors are required to :</p> <ol style="list-style-type: none"> a. Ensure that the activities are structured with proper assessment and b. Submit, at the end of the training session, an assessment report on the performance of the student, with details of activities undertaken and an overall grade of Pass <u>or</u> Fail.

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	CE603
Subject Title	Research Frontiers in Construction and Environment
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	<p>This subject is intended to provide students with:</p> <ol style="list-style-type: none"> 1. a good understanding of the research foci and achievements of the Faculty and its constituent departments 2. a broad perspective of key research issues in the broad field of construction and environment 3. general knowledge of the current status and future challenges of key research areas of FCE and their relationship with the student's own research 4. an exposure to different research cultures, techniques and approaches employed in different research areas and how they may be exploited in the student's own work 5. opportunities to interact with leading scholars from the four constituent departments of FCE 6. opportunities to interact with fellow research students to lay the groundwork for future collaborations
Intended Learning Outcomes (Note 1)	<p>Upon completion of the subject, students will possess:</p> <ol style="list-style-type: none"> 1. a broad perspective of key research issues in the field of construction and environment; 2. a good knowledge of the wide range of expertise available in the Faculty; 3. an understanding of the different approaches employed in different research areas; and 4. an awareness of opportunities for research collaborations in the Faculty.
Subject Synopsis/ Indicative Syllabus (Note 2)	<p>Overview of Research in FCE and selected topics in the field of construction and environment which may include:</p> <p>Urban Planning and Management; Construction Management; Construction Technology; Building Environmental Performance; Energy Efficient Building Technologies; Renewable Energy Applications; Transportation Engineering; Structural Engineering; Environmental Science and Engineering; Geotechnical Engineering; Hydraulic and Coastal Engineering; Remote Sensing and Geographic Information Systems; and Modern Positioning Technology.</p>
Teaching/Learning Methodology (Note 3)	<p>A group of academic staff from the four constituent departments of FCE will share the teaching of the subject. The lecturers will all be active researchers in their fields and they will each provide a critical exposition of the current status and future challenges in their own/related research areas. Ample opportunities will be provided for classroom discussions.</p>

Assessment Methods in Alignment with Intended Learning Outcomes (Note 4)	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
			a	b	c	d		
	1. In-class test	60%	✓	✓	✓	✓		
	2. Project report	40%	✓	✓	✓	✓		
	Total	100 %						
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>In-class tests can evaluate students' understanding gained at each lecture efficiently and effectively.</p>								
Student Study Effort Expected	Class contact:							
	▪ Lecture		39 Hrs.					
	▪		Hrs.					
	Other student study effort:							
	▪ Reading of reference materials		24 Hrs.					
	▪ Writing project report		60 Hrs.					
	Total student study effort		123 Hrs.					
Reading List and References	To be provided by individual teaching staff.							

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	HTI6081
Subject Title	Ethics: Research, Professional & Personal Perspectives
Credit Value	1
Level	3
Pre-requisite / Co-requisite/ Exclusion	None
Objectives	<ul style="list-style-type: none"> • To instill in students a deep appreciation of ethical guidelines and codes of conduct that they can apply in their research studies at PolyU and in their future professional and personal lives.
Intended Learning Outcomes (Note 1)	<p>On successful completion of this subject, students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate knowledge and understanding of the need for ethical behaviour and guiding codes of ethics in research and the professions. 2. Understand, discuss and apply ethical principles and codes across a range of disciplines and scenarios 3. Demonstrate awareness of current ethical issues and problems in relation to their own discipline and research area 4. Critically analyze and discuss scenarios cases of possible or actual ethical misconduct 5. Discuss how the guiding principles of ethics in research extend and apply to business, professional and personal codes of conduct and why this important to integrity and the well being of business, the professions and our community. 6. Show a fundamental understanding of the issues of copyright, plagiarism and proper citation, and be able to apply this in their own work.
Subject Synopsis/ Indicative Syllabus (Note 2)	<ul style="list-style-type: none"> • The need for ethics training and the meaning of ethical behaviour in research: case studies, disasters and learning by the mistakes of others • Philosophy and codes of ethics and their origins • Culture, religion and the law – how these relate to ethical codes of conduct • Obtaining ethical approval for a research project: procedures and processes • Ethics in life science, humanities, education, business and industry: common issues, guiding principles, discipline specific scenarios • Ethics and human behavior: individual, professional and societal responsibilities • Recent ethical issues affecting Hong Kong and society in general • Ethical use of information in thesis writing: understanding copyright, plagiarism and proper citation

Teaching/Learning Methodology (Note 3)	Lecture/seminar/workshop																																						
Assessment Methods in Alignment with Intended Learning Outcomes (Note 4)	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>1. Discipline specific scenario/case study analysis (to be graded by chief supervisor of each RPgS)</td> <td>50%</td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>2. Group assignment (e.g. debate, presentation, production of written material such as a poster or booklet)</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></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <ol style="list-style-type: none"> 1. Discipline specific scenario/case study analysis will assess ability to identify and analyse ethical issues in the student's own discipline and to present a coherent and detailed critique and plan on how these could be avoided or resolved (giving sources and written work accompanied by a Turn-it-in Report). 2. The group assignment will assess the student's ability to identify, discuss and analyse ethical principles and issues from a wide perspective, and evaluate how individual, professions and societies benefit from following ethically acceptable behavior and practices. 	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						1	2	3	4	5	6	1. Discipline specific scenario/case study analysis (to be graded by chief supervisor of each RPgS)	50%	✓		✓			✓	2. Group assignment (e.g. debate, presentation, production of written material such as a poster or booklet)	50%		✓		✓	✓		Total	100 %						
Specific assessment methods/tasks	% weighting			Intended subject learning outcomes to be assessed (Please tick as appropriate)																																			
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Total	100 %																																						
Student Study Effort Expected	<table border="1"> <tr> <td>Class contact:</td> <td></td> </tr> <tr> <td>▪ Lecture/seminar/workshop</td> <td>15 Hrs.</td> </tr> <tr> <td>▪</td> <td>Hrs.</td> </tr> <tr> <td>Other student study effort:</td> <td></td> </tr> <tr> <td>▪ Self study and group work</td> <td>30 Hrs.</td> </tr> </table>	Class contact:		▪ Lecture/seminar/workshop	15 Hrs.	▪	Hrs.	Other student study effort:		▪ Self study and group work	30 Hrs.																												
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	<ul style="list-style-type: none"> ▪ Assignment preparation 	15 Hrs.
	Total student study effort	60 Hrs.
Reading List and References	Materials from the Hong Kong Ethics development website (http://www.icac.org.hk/hkedc/eng/library2.asp) Materials from EthicsWeb.ca (http://www.ethicsweb.ca/resources/professional/issues.html) Selected readings and videos Declaration of Helsinki (revised 2008)	

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

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The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	CE620
Subject Title	Research Methods
Credit Value	3
Level	6
Pre-requisite / Co-requisite/ Exclusion	Basic knowledge on Probability
Objectives	<ul style="list-style-type: none"> • To provide an understanding of the fundamental principles and techniques for scientific research. • To enable students to properly identify and apply appropriate research methodologies to their research problems. • To enable students become proficient in data analysis, statistical tests and writing for scientific research.
Intended Learning Outcomes (Note 1)	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> • Understand research theory, research basics and scientific thinking. • Understand a range of research methods for exploratory data analysis and modelling techniques. • Master techniques for thesis/paper/proposal writing and scientific presentation. • Appreciate the limitation of the learned theory/ methods/techniques. • Apply the learned theory/ methods/techniques to their research projects.
Subject Synopsis/ Indicative Syllabus (Note 2)	<p>Research theory Research basics. Research theory. Research method. Research ethics. Research attitude. Research values. Research wisdom. PhD Research.</p> <p>Research cycle: from broad topic to hypothesis Selection of research topic. Understanding and interpretation of the literature. Recognition of new questions. Research hypothesis. Making hypothesis. Design of experiments. Analysis and interpretation of the results. Presentation of the results.</p> <p>Research design Components of experimental design. Guidelines for experiment design. Cause-effect analysis. Ideas to learn from classic scientific experiments.</p>

	<p>Consideration of unexplained variations. Sample size. Sampling strategy. Significance.</p> <p>Research thinking Components and ways of creative thinking. Ways of thinking leading to great innovation. Ways of thinking by great scientists and inventors. General scientific principles to guide thinking. Ways to improve creativity. Creative block.</p> <p>Research writing/presentation Ways of writing. Type of proposals and proposal writing. Construction of title/heading and logic flow. Techniques for writing abstract, introduction, body, discussion and conclusion. Guidelines for organizing citations and references. Ethics issue. Common mistakes in presentation. Guidelines for good presentation.</p> <p>Statistical analysis and modelling Linear regression. Multiple linear regression. Geographical weighted regression. Robust regression. Outliers detection. Association rules mining. Clustering. Time series analysis. Big data analysis.</p> <p>Result interpretation: Statistical significance tests Steps in Testing for Statistical Significance. Selection of a probability of error level (alpha level). Various tests (Chi square test, T-Test, U-test, Z-test). Interpretation of test results.</p>																																								
<p>Teaching/Learning Methodology <i>(Note 3)</i></p>	<p>Lectures and class discussions are followed by problem based tutorial assignments that are used to practice of theory and methods learnt during lectures in solving student's discipline oriented problems.</p>																																								
<p>Assessment Methods in Alignment with Intended Learning Outcomes <i>(Note 4)</i></p>	<table border="1" data-bbox="533 1355 1482 1832"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> </tr> </thead> <tbody> <tr> <td>1. Assignments</td> <td>20</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>2. Tests</td> <td>40</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>3. Projects</td> <td>40</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="5"></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assignments and projects are designed to apply learned concepts to practical problems.</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					a	b	c	d	e	1. Assignments	20		✓	✓		✓	2. Tests	40	✓	✓	✓	✓		3. Projects	40	✓	✓	✓	✓	✓	Total	100 %					
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Total	100 %																																								

	Tests are designed to formally assess the intended learning outcomes. Students are expected to achieve a minimum standard to be able to obtain a passing grade in line with criterion referenced assessment approach.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials	13 Hrs.
	Other student study effort:	
	▪ Assignments and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	To be provided by subject lecturer of each semester.	

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Reading List and References

- Allhoff F (ed.) 2009 *Philosophies of the Sciences: A Guide*, John Wiley & Sons.
- Campbell S 2004 *Flaws and Fallacies in Statistical Thinking*. Dover Publications.
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<http://www.msubillings.edu/mathfaculty/mmcbride/MiniTabManual.pdf>
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<http://trochim.human.cornell.edu/kb/index.htm>.
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