

## **Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) Programs in Civil Engineering**

### *Curriculum for Master of Philosophy (MPhil) Program in Civil Engineering*

The Master of Philosophy (MPhil) program requires completion of at least 12 credits of approved coursework.

All full-time and part-time students are required to take and pass ENGG 6770 Professional Development in Engineering in their first 1.5 years of study. Students may be exempted from certain course events, subject to prior approval of the School. Part-time students may be given extension to complete the course, subject to prior approval of the School.

Full-time RPg students are required to take an English Language Proficiency Assessment (ELPA) Speaking Test administered by the Center for Language Education before the start of their first term of study. Students whose ELPA Speaking Test score is below Level 4, or who failed to take the test in their first term of study, are required to take LANG 5000 Foundation in Listening & Speaking for Postgraduate Students until they pass the course by attaining at least Level 4 in the ELPA Speaking Test before graduation.

Full-time students must also complete LANG 5001 Postgraduate English for Engineering Research Studies. Students can be exempted from taking LANG 5001 with the agreement of the Department Head and PG Coordinator.

The credits earned from ENGG 6770, LANG 5000 and LANG 5001 cannot be counted toward the credit requirements.

In addition, full-time students are required to attend departmental seminars. They are required to take and pass CIVL 6050 Civil Engineering Seminar I at least twice, and CIVL 6060 Civil Engineering Seminar II at least once.

### Nanotechnology Concentration

In addition to the program requirements specified above, students who opt for the Nanotechnology concentration are required to:

- Take one NANO course;
- Complete NANO 6010 Advanced Topics in Nano Science and Technology for one term; and
- Conduct research in nano area.

### Energy Technology Concentration

In addition to the program requirements specified above, students who opt for the Energy Technology concentration are required to:

- Take one ENEG course;
- Complete ENEG 6010 Advanced Topics in Energy Technology for one term. They can use ENEG 6010 to replace one term of registration of CIVL 6050; and
- Conduct research in energy area.

On completion of the program of study and research, the student shall submit a thesis demonstrating competence in engineering research. The work described must have been substantially completed subsequent to enrollment for the degree. The thesis should reach a satisfactory standard of expression and presentation, and consist of an account of the student's own research. The student may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or some other similar awards.

### Scientific Computation Concentration

In addition to the existing program requirements, students who opt for the Scientific Computation concentration are required to:

- (i) MPhil: Complete a minimum of 7 credits from the following course lists.  
PhD: Complete a minimum of 10 credits from the follow course lists.

The credits earned under the concentration will be counted toward the total credit requirements of the programs.

#### Core Courses

MPhil: at least 3 credits

PhD: at least 6 credits

All students must take MATH 6915 and MATH 6916. Credits earned from MATH 6915 can be repeated for up to 2 credits.

COMP 5112	Parallel Programming
CIVL 5390	Finite Element Methods; or
MECH 5930	Finite Element Methods
CSIC 5001	Introduction to Advanced Computing Systems
CSIC 5011	Topological and Geometric Data Reduction and Visualization
CSIC 5031	Modeling, Optimization and Statistics
MATH 5311	Advanced Numerical Methods I
MATH 6915	Scientific Computation Seminar
MATH 6916	Student Seminars on Computation Related Research

Elective Courses

CHEM 5210	Computational Chemistry
CHEM 5220	Statistical Mechanics: Theory and Applications in Complex Systems
COMP 5212	Machine Learning
COMP 5213	Introduction to Bayesian Networks
COMP 5331	Knowledge Discovery in Databases
COMP 5421	Computer Vision
CSIC 5190	Special Topics in Scientific Computation
ELEC 5810	Introduction to Bioinformatics Algorithms
ELEC 5140	Advanced Computer Architecture
MATH 5350	Computational Fluid Dynamics for Inviscid Flows
MATH 5360	Weather, Climate and Pollution
MATH 5411	Advanced Probability Theory I
MATH 5431	Advanced Mathematical Statistics I
MECH 5230	Computational Fluid Dynamics and Heat Transfer
MECH 5280	Transport Phenomena and Its Application in Energy Systems
MSDM 5004	Mathematical Methods for Data Analysis
PHYS 5410	Numerical Modeling in Physics

- (ii) Conduct research in the area of scientific computation.

***Curriculum for Doctor of Philosophy (PhD) Program in Civil Engineering***

The Doctor of Philosophy (PhD) program requires completion of at least 24 credits of approved coursework. Students with a master's degree may be granted credit transfer of up to 12 credits, subject to approval. PhD students are required to obtain a GGA of 3.150 for graduation. Students are also required to fulfill the school requirements on PhD programs stipulated in the section of *School of Engineering*.

All full-time and part-time students are required to take and pass ENGG 6770 Professional Development in Engineering and CIVL 6770 Professional Development in Civil and Environmental Engineering. Students may be exempted from certain ENGG 6770 events, subject to prior approval of the School. Part-time students may be exempted from a maximum of 50% of mini-workshops of CIVL 6770, subject to prior approval of the Department.

Students are expected to complete the Professional Development courses in their first two years of study. Subject to approval, part-time students may be given extension to complete the courses. HKUST MPhil graduates in Civil Engineering who have taken and passed ENGG 6770 before may be exempted from taking the same course, subject to prior approval from the Department Head and PG Coordinator.

Full-time RPg students are required to take an English Language Proficiency

Assessment (ELPA) Speaking Test administered by the Center for Language Education before the start of their first term of study. Students whose ELPA Speaking Test score is below Level 4, or who failed to take the test in their first term of study, are required to take LANG 5000 Foundation in Listening & Speaking for Postgraduate Students until they pass the course by attaining at least Level 4 in the ELPA Speaking Test before graduation.

Full-time students are also required to take and pass LANG 5001 Postgraduate English for Engineering Research Studies. Students can be exempted from taking LANG 5001 with the agreement of the Department Head and PG Coordinator.

The credits earned from ENGG 6770, CIVL 6770, LANG 5000 and LANG 5001 cannot be counted toward the credit requirements.

In addition, full-time students are required to attend departmental seminars, and take and pass CIVL 6050 Civil Engineering Seminar I at least four times. All PhD students, regardless of study mode, are required to take and pass CIVL 6060 Civil Engineering Seminar II at least twice.

#### Nanotechnology Concentration

In addition to the program requirements specified above, students who opt for the Nanotechnology concentration are required to:

- Take one NANO course;
- Complete NANO 6010 Advanced Topics in Nano Science and Technology for one term; and
- Conduct research in nano area.

#### Energy Technology Concentration

In addition to the program requirements specified above, students who opt for the Energy Technology concentration are required to:

- Take one ENEG course;
- Complete ENEG 6010 Advanced Topics in Energy Technology for one term. They can use ENEG 6010 to replace one term of registration of CIVL 6050; and
- Conduct research in energy area.

#### Scientific Computation Concentration

In addition to the existing program requirements, students who opt for the Scientific Computation concentration are required to:

- (i) MPhil: Complete a minimum of 7 credits from the following course lists.  
 PhD: Complete a minimum of 10 credits from the follow course lists.

The credits earned under the concentration will be counted toward the total credit requirements of the programs.

Core Courses

MPhil: at least 3 credits

PhD: at least 6 credits

All students must take MATH 6915 and MATH 6916. Credits earned from MATH 6915 can be repeated for up to 2 credits.

COMP 5112	Parallel Programming
CIVL 5390	Finite Element Methods; or
MECH 5930	Finite Element Methods
CSIC 5001	Introduction to Advanced Computing Systems
CSIC 5011	Topological and Geometric Data Reduction and Visualization
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Elective Courses

CHEM 5210	Computational Chemistry
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MECH 5230	Computational Fluid Dynamics and Heat Transfer
MECH 5280	Transport Phenomena and Its Application in Energy Systems
MSDM 5004	Mathematical Methods for Data Analysis
PHYS 5410	Numerical Modeling in Physics

- (ii) Conduct research in the area of scientific computation.

To become a doctoral candidate, a student must pass a qualifying examination. Full-time PhD students are expected to pass the qualifying examination within 18 months of initial registration while part-time PhD students are expected to pass the qualifying examination within 36 months of initial registration. A maximum postponement of 3 months may be allowed, subject to prior approval from the departmental PG Committee. The qualifying examination consists of both written and oral examinations. The written examination evaluates the student's comprehension of scientific and engineering principles and engineering synthesis, and the student's preparation for postgraduate study. Prior to undertaking the examinations, each PhD student will have prepared a written thesis research proposal, and will orally present and defend it. In addition, the student will answer questions of a general civil engineering nature and questions relevant to the proposed research.

Following the above, the Qualifying Examination Committee will recommend that (1) the student has passed the qualifying examination and is a candidate for the degree; or (2) the student should undertake further studies to rectify deficiencies uncovered in the examination but may continue with the research component without another written or oral examination, and upon successful completion of these further studies, the student will automatically become a candidate for the degree; or (3) the student should undertake further studies and must repeat the written and/or oral component within 6 months; or (4) the student has failed and must withdraw from the PhD program. Students who fail the qualifying examination for the second time will be required to withdraw from the PhD program or, with the special approval of the departmental PG Committee, be allowed to transfer to the MPhil program.

On completion of the program of study and research, the student shall submit a thesis demonstrating competence in engineering research. The work described must have been substantially completed subsequent to enrollment for the degree. The thesis should reach a satisfactory standard of expression and presentation, and consist of an account of the student's own research. The student may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or some other similar awards.