

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

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

The Master of Philosophy (MPhil) program aims to strengthen students' general background in mathematics, and mathematical sciences, and to expose students to the environment and scope of mathematical research. It can be a terminal degree or a preliminary degree leading to the PhD, and requires research leading to a thesis as well as a course program. Students with a first degree in an area other than mathematics may be required to take additional courses. In the final stage of study, students must submit their thesis to the Department and, subsequently, to present and defend it.

Specific program requirements are:

- 24 credits in mathematics or related fields, normally at least 18 credits of which are mathematics courses at postgraduate level;
- Completion of and passing MATH 6770 Professional Development in Science (Mathematics). Students are expected to complete the course in their first year of study. The maximum time allowed for course completion is two years for full-time students, or three years for part-time students. The 2 credits earned from MATH 6770 cannot be counted toward the credit requirements;
- 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;
- Completion of and passing LANG 5010 Postgraduate English for Science Studies, which should be taken in the first year of study. The 1 credit earned from LANG 5010 cannot be counted toward the credit requirements;
- All full-time students are required to take and pass MATH 6900 Mathematics Seminar in their first four regular terms of study; maximum number of credits to be earned from this course is 4. MATH 6770 can be used as a replacement for one regular term of MATH 6900;
- Registration in MATH 6990 MPhil Thesis Research; and
- Presentation and oral defense of the MPhil thesis.

### Scientific Computation Concentration

In addition to the existing program requirements, students who opt for the Scientific

Computation concentration are required to:

- Complete MATH 6915 Scientific Computation Seminar. The 1 credit earned cannot be counted toward the credit requirements;
- Complete one computation related course from the list below as a part of the 24 credits of required coursework:

CHEM 5210	Computational Chemistry
MATH 5311	Advanced Numerical Methods I
MATH 5312	Advanced Numerical Methods II
MATH 5350	Computational Fluid Dynamics for Inviscid Flows
MATH 5360	Weather, Climate and Pollution
PHYS 5410	Numerical Modeling in Physics
- Conduct research in the area of scientific computation; and
- Give a one-hour seminar on the related research within their first four regular terms of study.

### ***Curriculum for Doctor of Philosophy (PhD) Program in Mathematics***

The Doctor of Philosophy (PhD) program aims to prepare students to become research scholars in an academic or industrial environment. It provides a broad background in mathematics and mathematical sciences, and aims to enable students to do independent and original research. Students can choose to focus their research in one of the three areas: Pure Mathematics, Applied Mathematics, and Probability and Statistics. The doctoral thesis must be an original contribution to the field. Students with a first degree in an area other than mathematics may be required to take additional courses.

To fulfill the degree requirements, students are expected to undertake coursework, attend and present seminars, and conduct thesis research. Students must pass a qualifying examination and, in the final stage of study, present and defend their theses.

Specific program requirements are:

- 36 credits in mathematics or related fields, of which at least 24 credits are mathematics courses at postgraduate level;
- Students obtained an MSc or MPhil degree from other institutions may be granted credit transfer of up to 18 credits, subject to departmental approval;
- Completion of and passing MATH 6770 Professional Development in Science (Mathematics). Students are expected to complete the course in their first year of study. The maximum time allowed for course completion is two years for full-time students, or three years for part-time students. The 2 credits earned from MATH 6770 cannot be counted toward the credit requirements. HKUST MPhil graduates in Mathematics who have taken

and passed this course before may be exempted from this requirement, 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;
- Completion of and passing LANG 5010 Postgraduate English for Science Studies, which should be taken in the first year of study. The 1 credit earned from LANG 5010 cannot be counted toward the credit requirements; HKUST MPhil graduates may be considered for exemption from this requirement, subject to prior approval from the Department Head and PG Coordinator;
- All full-time students are required to take and pass MATH 6900 Mathematics Seminar in their first four regular terms of study; maximum number of credits to be earned from this course is 4. MATH 6770 can be used as a replacement for one regular term of MATH 6900;
- Passing the qualifying examination:
  - i) Pure Mathematics  
To become PhD candidates, students must first pass a written qualifying examination (normally at the end of the first year of study) on two of the three subject areas: analysis, algebra, and geometry. At a later date (normally no later than the end of the second year of study) an oral examination on a major area excluding the two areas covered in the written examination.
  - ii) Applied Mathematics  
To become PhD candidates, students must first pass a written preliminary examination (normally before the end of the first year of study) on two subjects: advanced calculus and linear algebra. Students must also submit a thesis proposal, and pass an oral examination on the thesis proposal and two minor subjects. The oral examination should normally take place before the end of the second year of study.
  - iii) Probability and Statistics  
To become PhD candidates, students must pass an oral qualifying examination on one major subject and two minor subjects (normally no later than the end of the second year of study). For Probability students, the major subject is Probability while the two minor subjects would be Statistics and an area in Mathematics or an appropriate area outside Mathematics. For Statistics students, the major subject is

Statistics while the two minor subjects would be Probability and an area in Mathematics or an appropriate area outside Mathematics.

- Registration in MATH 7990 Doctoral Thesis Research; and
- Presentation and oral defense of the PhD thesis.

#### Scientific Computation Concentration

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

- Complete MATH 6915 Scientific Computation Seminar. The 1 credit earned cannot be counted toward the credit requirements;
- Complete one computation related course from the list below as a part of the 36 credits of required coursework:

CHEM 5210	Computational Chemistry
MATH 5311	Advanced Numerical Methods I
MATH 5312	Advanced Numerical Methods II
MATH 5350	Computational Fluid Dynamics for Inviscid Flows
MATH 5360	Weather, Climate and Pollution
PHYS 5410	Numerical Modeling in Physics
- Conduct research in the area of scientific computation; and
- Give a one-hour seminar on the related research within their first four regular terms of study.