Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) Programs in Bioengineering

Curriculum for Master of Philosophy (MPhil) Program in Bioengineering

The Master of Philosophy (MPhil) program requires completion of at least 12 credits of coursework, including 3 credits of BIEN courses (BIEN 5010 Molecular Biology for Bioengineering, BIEN 5040 Introduction to Bioengineering Research or BIEN 5820 Microfluidics and Biosensors), 3 credits from the restrictive bioengineering electives, and 6 credits of non-restrictive elective courses selected from students' chosen area of major concentration.

Students without a degree in Biology or related disciplines may be required to take at least one additional undergraduate course covering appropriate basic knowledge in life science and obtain a passing grade of C+ or above. Subject to the approval of the Program Director, students may be exempted from this requirement.

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 may be exempted from taking LANG 5001 with the agreement of the Program Director.

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

Full-time students must take BIEN 6800 Bioengineering Seminar every regular term, and present at least one seminar during their study. They must pass BIEN 6800 three times including once in the term when they present their seminar. Part-time students must take and pass BIEN 6800 at least once in the term when they present their seminar.

In addition, students must complete a thesis in order to demonstrate their competence in bioengineering research. If a student participates in an industrial project and writes

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a thesis on a work-related topic, the thesis will be supervised jointly by a faculty member of the program and a representative from the participating company.

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 Bioengineering

The Doctor of Philosophy (PhD) program requires completion of at least 15 credits of coursework, including 6 credits of core courses (BIEN 5010 Molecular Biology for Bioengineering and BIEN 5040 Introduction to Bioengineering Research), 3 credits from the restrictive bioengineering electives, and 6 credits of non-restrictive elective courses selected from students' chosen area of major concentration. Students are also required to fulfill the school requirements on PhD programs stipulated in the section of *School of Engineering*.

Students without a degree in Biology or related disciplines may be required to take at least one additional undergraduate course covering appropriate basic knowledge in life science and obtain a passing grade of C+ or above. Subject to the approval of the Program Director, students may be exempted from this requirement.

Students entering with a master's or equivalent degree in Engineering or related discipline may be granted credit transfer of up to 6 credits. Students entering with a master's degree in Bioengineering may be granted credit transfer of up to 12 credits, subject to the approval of the Program Director.

All full-time and part-time students must take and pass ENGG 6770 Professional Development in Engineering and BIEN 6770 Professional Development in Bioengineering. 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 BIEN 6770, subject to prior approval of the Program. 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 Bioengineering who have taken and passed ENGG 6770 before may be exempted from taking the same course, subject to prior approval from the Program Director 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 must also complete LANG 5001 Postgraduate English for

Engineering Research Studies.   They may be exempted from taking LANG 5001 with the agreement of the Program Director.

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

In addition, full-time students must take BIEN 6800 Bioengineering Seminar every regular term, and present at least two seminars during their study.   They must pass BIEN 6800 five times including the terms when they present their seminars. Part-time students must take and pass BIEN 6800 at least twice in the terms when they present their seminars.

To become a doctoral candidate, the student must pass a qualifying examination within the first 1.5 years of study.   Upon completion of the course requirement and the thesis, the candidate is required to defend the thesis before a Thesis Examination Committee.

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.

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