Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) Programs in Life Science

Curriculum for Master of Philosophy (MPhil) Program in Life Science

The Master of Philosophy (MPhil) program enables students to acquire the experience and knowledge required for research on life science projects. While an original contribution to life science knowledge is not a prerequisite to the completion of the MPhil degree, the attainment of scientific competence is important. The aim of the MPhil program is to train qualified postgraduate students who can conduct supervised research in life science. Students with a first degree in an area not directly related to life science may be required to take additional courses.

To fulfill the degree requirements, students are expected to attend seminars organized in each regular term and present seminars as required, undertake coursework, and conduct thesis research. In the final stage of study, students are required to submit a thesis to the Division and, subsequently, to present and defend it.

Specific program requirements are:

- 6 credits of coursework from the following course list, of which no more than 3 credits of 4000-level courses:

ENVS	6012	Special Topics in Environmental Science
LIFS	4060	Immunobiology
LIFS	4090	Developmental Biology
LIFS	4140	Cancer Biology
LIFS	4150	Plant Biotechnology
LIFS	4170	Advanced Molecular Genetics
LIFS	4190	Advanced Cell Biology
LIFS	4360	Aquaculture Biotechnology
LIFS	4370	Human Genetics and Personalized Medicine
LIFS	4380	Pharmacology and Toxicology
LIFS	4540	Structure and Function of Proteins
LIFS	4550	Biochemistry of Nutrition
LIFS	4580	Bioinformatics
LIFS	4620	Advanced Biological Chemistry
LIFS	4630	Advanced Topics in Biotechnology
LIFS	4760	Biochemistry of Diseases
LIFS	4950	Neurochemistry
LIFS	5001	Responsible Conduct of Biomedical and Biotechnology Research
LIFS	5070	Workshops in Biosciences
LIFS	5120	Advanced Topics in Biophysical Chemistry
LIFS	5240	Molecular and Developmental Neurobiology
LIFS	5260	Biochemical and Molecular Basis of Diseases
LIFS	5320	Ecotoxicology
LIFS	5710	Cellular Regulation
LIFS	6170	Special Topics in Molecular, Cell and Developmental Biology

LIFS	6660	Molecular Medicine
LIFS	6800	Frontiers in Nucleic Acid Research

Plus:

- Completion of and passing LIFS 6770 Professional Development in Science (Life Science) (2 credits). 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 credits earned from LIFS 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. The 1 credit earned from LANG 5000 cannot be counted toward the credit requirements;
- Taking and passing LANG 5010 Postgraduate English for Science Studies (1 credit) in the first year of study;
- Taking and passing one of the courses* listed below in each regular term throughout the residency:

LIFS	6112	Current Topics in Neuroscience
LIFS	6113	Current Topics in Biochemistry and Biophysics
LIFS	6114	Current Topics in Biotechnology and Traditional Chinese Medicine
LIFS	6115	Current Topics in Development and Systems Biology
LIFS	6116	Current Topics in Genomics and Bioinformatics
LIFS	6117	Current Topics in Cell Biology

  Each course can be taken repeatedly in different terms. Students who fail a course are required to retake the course in a subsequent term. LIFS 6111 taken before the 2017/18 academic year can be used to replace any of these courses;

- Taking and passing LIFS 6410 Seminar Enrichment Course throughout the residency; maximum number of credits to be earned from this course is 2;
- Registration in LIFS 6990 MPhil Thesis Research; and
- Presentation and oral defense of the MPhil thesis.

No credit transfer will be allowed.

Molecular Medicine Concentration

For students who opt for the Molecular Medicine concentration, specific program requirements are:

- 3 credits of coursework from the following course list:

ENVS	6012	Special Topics in Environmental Science
LIFS	4060	Immunobiology
LIFS	4090	Developmental Biology
LIFS	4140	Cancer Biology
LIFS	4150	Plant Biotechnology
LIFS	4170	Advanced Molecular Genetics
LIFS	4190	Advanced Cell Biology
LIFS	4360	Aquaculture Biotechnology
LIFS	4370	Human Genetics and Personalized Medicine
LIFS	4380	Pharmacology and Toxicology
LIFS	4540	Structure and Function of Proteins
LIFS	4550	Biochemistry of Nutrition
LIFS	4580	Bioinformatics
LIFS	4620	Advanced Biological Chemistry
LIFS	4630	Advanced Topics in Biotechnology
LIFS	4760	Biochemistry of Diseases
LIFS	4950	Neurochemistry
LIFS	5001	Responsible Conduct of Biomedical and Biotechnology Research
LIFS	5070	Workshops in Biosciences
LIFS	5120	Advanced Topics in Biophysical Chemistry
LIFS	5240	Molecular and Developmental Neurobiology
LIFS	5260	Biochemical and Molecular Basis of Diseases
LIFS	5320	Ecotoxicology
LIFS	5710	Cellular Regulation
LIFS	6170	Special Topics in Molecular, Cell and Developmental Biology
LIFS	6800	Frontiers in Nucleic Acid Research

Plus:

- Completion of and passing LIFS 6770 Professional Development in Science (Life Science) (2 credits). Students are expected to complete the course requirements 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 credits earned from LIFS 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. The 1 credit earned from LANG 5000 cannot be counted toward the credit requirements;

- Taking and passing LANG 5010 Postgraduate English for Science Studies (1 credit) in the first year of study;
- LIFS 6660 Molecular Medicine;
- Taking and passing one of the courses* listed below in each regular term throughout the residency:

LIFS	6112	Current Topics in Neuroscience
LIFS	6113	Current Topics in Biochemistry and Biophysics
LIFS	6114	Current Topics in Biotechnology and Traditional Chinese Medicine
LIFS	6115	Current Topics in Development and Systems Biology
LIFS	6116	Current Topics in Genomics and Bioinformatics
LIFS	6117	Current Topics in Cell Biology

Each course can be taken repeatedly in different terms. Students who fail a course are required to retake the course in a subsequent term. LIFS 6111 taken before the 2017/18 academic year can be used to replace any of these courses;

- Taking and passing LIFS 6410 Seminar Enrichment Course throughout the residency; maximum number of credits to be earned from this course is 2;
- Registration in LIFS 6990 MPhil Thesis Research;
- Conduct research in the area of molecular medicine; 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:

(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.

** Students with research focus in Marine and Environmental Science may take ENVS 6011 Postgraduate Seminar to substitute LIFS 6112/ LIFS 6113/ LIFS 6114/ LIFS 6115/ LIFS 6116/ LIFS 6117.*

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 Life Science

The Doctor of Philosophy (PhD) program aims to prepare students through completion of a research project, to become independent scientists capable of the design, initiation and execution of original research. This program will train students to prepare and publish their main findings in peer-reviewed international journals and are ready to independently conduct advanced-level research projects by the time of their graduation. Students with a first degree in an area not directly related to life science may be required to take additional courses.

To fulfill the degree requirements, students are expected to attend seminars organized in each regular term and present seminars as required, undertake coursework, and conduct thesis research. Students are also required to pass a qualifying examination set by the Division. In the final stage of study, students are required to submit a thesis and, subsequently, to present and defend it.
Specific program requirements are:

- 9 credits of coursework from the following course list, of which no more than 3 credits of 4000-level courses:

ENVS	6012	Special Topics in Environmental Science
LIFS	4060	Immunobiology
LIFS	4090	Developmental Biology
LIFS	4140	Cancer Biology
LIFS	4150	Plant Biotechnology
LIFS	4170	Advanced Molecular Genetics
LIFS	4190	Advanced Cell Biology
LIFS	4360	Aquaculture Biotechnology
LIFS	4370	Human Genetics and Personalized Medicine
LIFS	4380	Pharmacology and Toxicology
LIFS	4540	Structure and Function of Proteins
LIFS	4550	Biochemistry of Nutrition
LIFS	4580	Bioinformatics
LIFS	4620	Advanced Biological Chemistry
LIFS	4630	Advanced Topics in Biotechnology
LIFS	4760	Biochemistry of Diseases
LIFS	4950	Neurochemistry
LIFS	5001	Responsible Conduct of Biomedical and Biotechnology Research
LIFS	5070	Workshops in Biosciences
LIFS	5120	Advanced Topics in Biophysical Chemistry
LIFS	5240	Molecular and Development Neurobiology
LIFS	5260	Biochemical and Molecular Basis of Diseases
LIFS	5320	Ecotoxicology
LIFS	5710	Cellular Regulation
LIFS	6170	Special Topics in Molecular, Cell and Developmental Biology
LIFS	6660	Molecular Medicine
LIFS	6800	Frontiers in Nucleic Acid Research

Plus:

- Completion of and passing LIFS 6770 Professional Development in Science (Life Science) (2 credits). Students are expected to complete the course requirements 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. HKUST MPhil graduates in Life Science who have taken and passed this course before may be exempted from this requirement, subject to prior approval from the Division Head and PG Coordinator. The credits earned from LIFS 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. The 1 credit earned from LANG 5000 cannot be counted toward the credit requirements;

- Taking and passing LANG 5010 Postgraduate English for Science Studies (1 credit) in the first year of study. HKUST MPhil graduates may be considered for exemption from this requirement, subject to prior approval from the Division Head and PG Coordinator;

- PhD students admitted without an HKUST MPhil degree in Life Science are required to take and pass one of the courses* listed below in each of the first four regular terms of study, followed by LIFS 6111 Life Science Postgraduate Student Seminar* starting from the fifth term in each regular term throughout the residency:

LIFS	6112	Current Topics in Neuroscience
LIFS	6113	Current Topics in Biochemistry and Biophysics
LIFS	6114	Current Topics in Biotechnology and Traditional Chinese Medicine
LIFS	6115	Current Topics in Development and Systems Biology
LIFS	6116	Current Topics in Genomics and Bioinformatics
LIFS	6117	Current Topics in Cell Biology

  Each course can be taken repeatedly in different terms. Students who fail a course are required to retake the course in a subsequent term. LIFS 6111 taken before the 2017/18 academic year can be used to replace any of these courses;

- Those admitted with an HKUST MPhil degree in Life Science are required to take and pass LIFS 6111 Life Science Postgraduate Student Seminar* in each regular term throughout the residency;

- Taking and passing LIFS 6410 Seminar Enrichment Course throughout the residency; maximum number of credits to be earned from this course is 4.

Students who have taken the HKUST MPhil program in Life Science will be granted credit transfer of up to 1 credit from LIFS 6410 to the PhD program;

- Passing a comprehensive qualifying examination;
- Registration in LIFS 7990 Doctoral Thesis Research; and
- Presentation and oral defense of the PhD thesis.

Molecular Medicine Concentration

For students who opt for the Molecular Medicine concentration, specific program requirements are:

- 3 credits of coursework from the following course list:

ENVS	6012	Special Topics in Environmental Science
LIFS	4060	Immunobiology
LIFS	4090	Developmental Biology
LIFS	4140	Cancer Biology
LIFS	4150	Plant Biotechnology
LIFS	4170	Advanced Molecular Genetics
LIFS	4190	Advanced Cell Biology
LIFS	4360	Aquaculture Biotechnology
LIFS	4370	Human Genetics and Personalized Medicine
LIFS	4380	Pharmacology and Toxicology
LIFS	4540	Structure and Function of Proteins
LIFS	4550	Biochemistry of Nutrition
LIFS	4580	Bioinformatics
LIFS	4620	Advanced Biological Chemistry
LIFS	4630	Advanced Topics in Biotechnology
LIFS	4760	Biochemistry of Diseases
LIFS	4950	Neurochemistry
LIFS	5001	Responsible Conduct of Biomedical and Biotechnology Research
LIFS	5070	Workshops in Biosciences
LIFS	5120	Advanced Topics in Biophysical Chemistry
LIFS	5240	Molecular and Development Neurobiology
LIFS	5320	Ecotoxicology
LIFS	5710	Cellular Regulation
LIFS	6170	Special Topics in Molecular, Cell and Developmental Biology
LIFS	6800	Frontiers in Nucleic Acid Research

Plus:

- Completion of and passing LIFS 6770 Professional Development in Science (Life Science) (2 credits). Students are expected to complete the course requirements 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. HKUST MPhil graduates in Life Science who have taken and passed this course before may be exempted from this

requirement, subject to prior approval from the Division Head and PG Coordinator. The credits earned from LIFS 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. The 1 credit earned from LANG 5000 cannot be counted toward the credit requirements;
- Taking and passing LANG 5010 Postgraduate English for Science Studies (1 credit) in the first year of study. HKUST MPhil graduates may be considered for exemption from this requirement, subject to prior approval from the Division Head and PG Coordinator;
- Taking LIFS 5260 Biochemical and Molecular Basis of Diseases;
- Taking LIFS 6660 Molecular Medicine;
- PhD students admitted without an HKUST MPhil degree in Life Science are required to take and pass one of the courses* listed below in each of the first four regular terms of study, followed by LIFS 6111 Life Science Postgraduate Student Seminar* starting from the fifth term in each regular term throughout the residency:

LIFS	6112	Current Topics in Neuroscience
LIFS	6113	Current Topics in Biochemistry and Biophysics
LIFS	6114	Current Topics in Biotechnology and Traditional Chinese Medicine
LIFS	6115	Current Topics in Development and Systems Biology
LIFS	6116	Current Topics in Genomics and Bioinformatics
LIFS	6117	Current Topics in Cell Biology

  Each course can be taken repeatedly in different terms. Students who fail a course are required to retake the course in a subsequent term. LIFS 6111 taken before the 2017/18 academic year can be used to replace any of these courses;
- Those admitted with an HKUST MPhil degree in Life Science are required to take and pass LIFS 6111 Life Science Postgraduate Student Seminar* in each regular term throughout the residency;
- Taking and passing LIFS 6410 Seminar Enrichment Course throughout the residency; maximum number of credits to be earned from this course is 4. Students who have taken the HKUST MPhil program in Life Science will be granted credit transfer of up to 1 credit from LIFS 6410 to the PhD program;
- Passing a comprehensive qualifying examination;

** Students with research focus in Marine and Environmental Science may take ENVS 6011 Postgraduate Seminar to substitute LIFS 6111/LIFS 6112/LIFS 6113/LIFS 6114/ LIFS 6115/LIFS 6116/LIFS 6117.*

- Registration in LIFS 7990 Doctoral Thesis Research;
- Conduct research in the area of molecular medicine; 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:

(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.