

THE UNIVERSITY OF HONG KONG

FACULTY OF SCIENCE

**Programme Learning Outcomes –Major in Biological Sciences (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes –Major in Biological Sciences (Intensive)**

By the end of this programme, students should be able to:

- (1) describe and explain the key concepts in genetics, molecular & cell biology; ecology, systematics and evolution; physiology and organismic biology, and to appraise the related ethical and moral issues (by means of coursework, laboratory- and/or research-based learning in the curriculum)
- (2) equip with sufficient knowledge in chemistry for application within a biological context (by means of coursework, laboratory- and/or research-based learning in the curriculum)
- (3) analyze and interpret quantitative and qualitative biological data to provide scientifically based conclusions and/or judgements (by means of coursework, laboratory- and/or research-based learning in the curriculum)
- (4) tackle biological research problems by formulating hypothesis and designing experimental investigations (by means of coursework, laboratory- and/or research-based learning in the curriculum)
- (5) communicate effectively and professionally with scientists, educators, media, and general public in oral and written forms (by means of coursework, laboratory- and/or research-based learning, and presentation opportunities in the curriculum)

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Biological Sciences (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<p>(1) describe and explain the key concepts in genetics, molecular &amp; cell biology; ecology, systematics and evolution; physiology and organismic biology, and to appraise the related ethical and moral issues</p> <p>(2) equip with sufficient knowledge in chemistry for application within a biological context</p>	<p>(1) explain the basic scientific principles and methods</p> <p>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</p> <p>(3) apply scientific processes and knowledge in a wide variety of careers and professions</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p> <p>(6) integrate acquired discipline- specific knowledge in a science for professional and further academic pursuit in that discipline</p>	<p>(1) pursuit of academic /professional excellence, critical intellectual enquiry and life-long learning</p>
<p>(3) analyze and interpret quantitative and qualitative biological data to provide scientifically based conclusions and/or judgements</p> <p>(4) tackle biological research problems by formulating hypothesis and designing experimental investigations</p>	<p>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</p> <p>(3) apply scientific processes and knowledge in a wide variety of careers and professions</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	<p>(2) tackling novel situations and ill-defined problems</p>
<p>(3) analyze and interpret quantitative and qualitative biological data to provide scientifically based conclusions and/or judgements</p> <p>(4) tackle biological research problems by formulating hypothesis and designing experimental investigations</p>	<p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	<p>(3) critical self- reflection, greater understanding of others, and upholding personal and professional ethics</p>

Programme Learning Outcomes – Major in Biological Sciences (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
(5) communicate effectively and professionally with scientists, educators, media, and general public in oral and written forms	(4) effectively communicate within and across the science disciplines (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(4) intercultural communication, and global citizenship
(5) communicate effectively and professionally with scientists, educators, media, and general public in oral and written forms	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
(3) analyze and interpret quantitative and qualitative biological data to provide scientifically based conclusions and/or judgements (4) tackle biological research problems by formulating hypothesis and designing experimental investigations	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition

**Programme Learning Outcomes –Major in Chemistry (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes –Major in Chemistry (Intensive)**

By the end of this programme, students should be able to:

- (1) demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic & physical chemistry, to advanced topics related to current research in chemistry  
*(by means of coursework, laboratory-based and/or research-based learning in the curriculum)*
- (2) demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical & practical problems  
*(by means of coursework, laboratory-based and/or research-based learning in the curriculum)*
- (3) have developed an awareness & understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world  
*(by means of coursework, laboratory-based and/or research-based learning in the curriculum)*
- (4) have substantially developed advanced experimental skills including chemical synthesis, analysis & operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information & infer appropriate conclusions  
*(by requiring of no less than 300 hours of laboratory classes in the curriculum)*
- (5) demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member  
*(by means of coursework, laboratory-based learning, group project & presentation opportunities in the curriculum)*
- (6) gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills  
*(by arrangement for chemistry research project of no less than 24 weeks, or student internship opportunities plus directed studies of no less than three weeks with chemistry-related companies or research laboratories)*

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Chemistry (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<p>(1) demonstrate an understanding across a wide range of topics in chemistry, from basic areas such as analytical, inorganic, organic &amp; physical chemistry, to advanced topics related to current research in chemistry</p> <p>(2) demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical &amp; practical problems</p> <p>(3) have developed an awareness &amp; understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world</p> <p>(4) have substantially developed advanced experimental skills including chemical synthesis, analysis &amp; operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information &amp; infer appropriate conclusions</p> <p>(5) demonstrate problem-solving skills, critical thinking, creativity &amp; effective written &amp; oral communication skills, and to co-operate with other people &amp; participate as an effective team member</p>	<p>(1) explain the basic scientific principles and methods</p> <p>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</p> <p>(3) apply scientific processes and knowledge in a wide variety of careers and professions</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p> <p>(6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline</p>	<p>(1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning</p>
<p>(2) demonstrate an in-depth understanding of fundamental physicochemical principles with the ability to apply that knowledge to the solution of theoretical &amp; practical problems</p> <p>(4) have substantially developed advanced experimental skills including chemical synthesis, analysis &amp; operation of modern instrumentation, and data analysis skills with the ability to interpret experimental information &amp; infer appropriate conclusions</p> <p>(5) demonstrate problem-solving skills, critical thinking, creativity &amp; effective written &amp; oral communication skills, and to co-operate with other people &amp; participate as an effective team member</p>	<p>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</p> <p>(3) apply scientific processes and knowledge in a wide variety of careers and professions</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	<p>(2) tackling novel situations and ill-defined problems</p>
<p>(3) have developed an awareness &amp; understanding of scientific and ethical issues where chemistry relates to other disciplines, and an appreciation of the impact of chemistry in the modern world</p>	<p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	<p>(3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics</p>

Programme Learning Outcomes – Major in Chemistry (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
(6) gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills	(4) effectively communicate within and across the science disciplines (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(4) intercultural communication, and global citizenship
(5) demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
(5) demonstrate problem-solving skills, critical thinking, creativity & effective written & oral communication skills, and to co-operate with other people & participate as an effective team member (6) gain experience in working in the real-life industrial or research environment, and enhance their initiative, interpersonal skills, time management skills & project organization skills	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition

**Programme Learning Outcomes – Major in Ecology & Biodiversity (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/ professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes – Major in Ecology & Biodiversity (Intensive)**

By the end of this programme, students should be able to:

- (1) understand and appreciate the major living and non-living components of the local, regional and global environment, and how they interact; evaluate their role in ecosystem functioning and identify threats to them; and know how these threats can be mitigated  
*(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)*
- (2) assess, understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to assess, study, manage and protect that diversity, and appraise the related moral and ethical issues  
*(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)*
- (3) have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks  
*(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)*
- (4) use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet  
*(by means of coursework, laboratory-based, tutorial classes and/or project-based learning in the curriculum)*
- (5) demonstrate original, independent and critical thinking, with mastery of a range of communication skills  
*(by means of coursework, project-based and presentation opportunities in the curriculum)*
- (6) have the skill and knowledge to pursue postgraduate ecological research in top-level Universities around the world or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China  
*(by means of coursework, tutorial classes, project-based and research-based learning in the curriculum)*
- (7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems in a changing world.  
*(by means of coursework, laboratory-based, tutorial classes, capstone learning and/or project-based learning in the curriculum)*

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Ecology & Biodiversity (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<ul style="list-style-type: none"> <li>(1) understand and appreciate the major living and non-living components of the local, regional and global environment, and how they interact; evaluate their role in ecosystem functioning and identify threats to them; and know how these threats can be mitigated</li> <li>(2) assess, understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to assess, study, manage and protect that diversity, and appraise the related moral and ethical issues</li> <li>(3) have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks</li> <li>(4) use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet</li> <li>(6) have the skill and knowledge to pursue postgraduate ecological research in top-level Universities around the world or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China</li> <li>(7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems in a changing world</li> </ul>	<ul style="list-style-type: none"> <li>(1) explain the basic scientific principles and methods</li> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> <li>(6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline</li> </ul>	<ul style="list-style-type: none"> <li>(1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning</li> </ul>
<ul style="list-style-type: none"> <li>(3) have sufficient experience of the basic techniques of modern ecological science and prepare to learn new ones for specific tasks</li> <li>(4) use IT tools appropriately, and access and evaluate materials from libraries, archives and the Internet</li> <li>(5) demonstrate original, independent and critical thinking, with mastery of a range of communication skills</li> <li>(7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems in a changing world</li> </ul>	<ul style="list-style-type: none"> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(2) tackling novel situations and ill-defined problems</li> </ul>
<ul style="list-style-type: none"> <li>(2) assess, understand and appreciate the variety of life in Hong Kong's and Southeast Asia's natural habitats, become equipped to assess, study, manage and protect that diversity, and appraise the related moral and ethical issues</li> </ul>	<ul style="list-style-type: none"> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics</li> </ul>



Programme Learning Outcomes – Major in Ecology & Biodiversity (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
(6) have the skill and knowledge to pursue postgraduate ecological research in top-level Universities around the world or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China	(4) effectively communicate within and across the science disciplines (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(4) intercultural communication, and global citizenship
(5) demonstrate original, independent and critical thinking, with mastery of a range of communication skills	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
(6) have the skill and knowledge to pursue postgraduate ecological research in top-level Universities around the world or to develop a career in nature conservation and environmental education, especially in Hong Kong and southern China (7) be motivated and sufficiently equipped to apply the knowledge solve local, regional and global environmental problems in a changing world	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition

**Programme Learning Outcomes – Major in Geology (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes – Major in Geology (Intensive)**

By the end of this programme, students should be able to:

- (1) describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources  
*(by means of coursework, laboratory-based, tutorial classes and project-based learning in the curriculum)*
- (2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues  
*(by means of both local and overseas residential field learning experience)*
- (3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources  
*(by means of capstone, project-based learning and presentation opportunities in the curriculum)*
- (4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession  
*(by means of internship opportunities in the curriculum)*
- (5) work with others in an effective manner and have learned to accept and appreciate different cultures  
*(by means of group project learning, field learning experience in the curriculum)*

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Geology (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<ul style="list-style-type: none"> <li>(1) describe and apply key concepts in the conventional areas of the geosciences, covering the areas of physical geology, historical geology, mineralogy, petrology, geochemistry, geophysics, structural geology, tectonics and petrogenesis, and earth resources</li> <li>(2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues</li> <li>(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession</li> <li>(5) work with others in an effective manner and have learned to accept and appreciate different cultures</li> </ul>	<ul style="list-style-type: none"> <li>(1) explain the basic scientific principles and methods</li> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> <li>(6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline</li> </ul>	<ul style="list-style-type: none"> <li>(1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning</li> </ul>
<ul style="list-style-type: none"> <li>(2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues</li> <li>(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession</li> </ul>	<ul style="list-style-type: none"> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(2) tackling novel situations and ill-defined problems</li> </ul>
<ul style="list-style-type: none"> <li>(2) have acquired the ability to make observation, description, measurement and analysis of common geological features in the field, conduct geological mapping as well as undertake independent geological study, and appraise the related ethical issues</li> <li>(5) work with others in an effective manner and have learned to accept and appreciate different cultures</li> </ul>	<ul style="list-style-type: none"> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics</li> </ul>

Programme Learning Outcomes – Major in Geology (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<p>(3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources</p> <p>(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession</p>	<p>(4) effectively communicate within and across the science disciplines</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	<p>(4) intercultural communication, and global citizenship</p>
<p>(3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources</p> <p>(5) work with others in an effective manner and have learned to accept and appreciate different cultures</p>	<p>(4) effectively communicate within and across the science disciplines</p>	<p>(5) communication and collaboration</p>
<p>(3) communicate scientific concepts and critically discuss aspects of contemporary issues pertaining to earth sciences, environments and resources</p> <p>(4) have gained some insight to the real-life industrial environment and developed connections within the geosciences profession</p>	<p>(3) apply scientific processes and knowledge in a wide variety of careers and professions</p>	<p>(6) leadership and advocacy for the improvement of the human condition</p>

THE UNIVERSITY OF HONG KONG

FACULTY OF SCIENCE

**Programme Learning Outcomes –Major in Mathematics (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/ professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes –Major in Mathematics (Intensive)**

By the end of this programme, students should be able to:

- (1) describe and present a variety of concepts and theories in mathematics (by means of coursework and learning activities in the curriculum)
- (2) apply mathematical theory and techniques to handle research-style questions, scrutinize problems, and appraise the related ethical issues (by means of coursework and learning activities in the curriculum)
- (3) communicate in mathematical language, and present mathematical ideas and scientific arguments (by means of coursework, seminars, guided studies and projects)
- (4) collaborate and work with other students in an effective manner (by means of guided studies, projects and seminars)
- (5) appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Mathematics (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<ul style="list-style-type: none"> <li>(1) describe and present a variety of concepts and theories in mathematics</li> <li>(2) apply mathematical theory and techniques to handle research-style questions, scrutinize problems, and appraise the related ethical issues</li> <li>(5) appreciate the beauty and power of mathematics</li> </ul>	<ul style="list-style-type: none"> <li>(1) explain the basic scientific principles and methods</li> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> <li>(6) integrate acquired discipline- specific knowledge in a science for professional and further academic pursuit in that discipline</li> </ul>	<ul style="list-style-type: none"> <li>(1) pursuit of academic /professional excellence, critical intellectual enquiry and life-long learning</li> </ul>
<ul style="list-style-type: none"> <li>(2) apply mathematical theory and techniques to handle research-style questions, scrutinize problems, and appraise the related ethical issues</li> <li>(5) appreciate the beauty and power of mathematics</li> </ul>	<ul style="list-style-type: none"> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(2) tackling novel situations and ill-defined problems</li> </ul>
<ul style="list-style-type: none"> <li>(2) apply mathematical theory and techniques to handle research-style questions, scrutinize problems, and appraise the related ethical issues</li> </ul>	<ul style="list-style-type: none"> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(3) critical self- reflection, greater understanding of others, and upholding personal and professional ethics</li> </ul>

Programme Learning Outcomes – Major in Mathematics (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
(3) communicate in mathematical language and present scientific arguments (4) collaborate and work with other students in an effective manner	(4) effectively communicate within and across the science disciplines (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(4) intercultural communication, and global citizenship
(3) communicate in mathematical language, and present mathematical ideas and scientific arguments (4) collaborate and work with other students in an effective manner	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
(2) apply mathematical theory and techniques to handle research-style questions, scrutinize problems, and appraise the related ethical issues (5) appreciate the beauty and power of mathematics (by means of guided studies, projects and seminars)	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition

**Programme Learning Outcomes –Major in Molecular Biology & Biotechnology (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes –Major in Molecular Biology & Biotechnology (Intensive)**

By the end of this programme, students should be able to:

- (1) describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology  
*(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)*
- (2) apply laboratory techniques essential to modern molecular science  
*(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)*
- (3) communicate in written and oral communication skills and collaborate with other students effectively  
*(by means of coursework, research-based learning and presentation opportunities in the curriculum)*
- (4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues  
*(by means of coursework and laboratory-based and/or research-based opportunities in the curriculum)*
- (5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment  
*(by means of coursework, laboratory-based and experiential learning in the curriculum)*
- (6) equip with knowledge in chemistry, mathematics, statistics, or computer programming, with sufficient depth and breadth to apply these knowledge within a biological context.
- (7) solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically.



#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Molecular Biology & Biotechnology (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<ul style="list-style-type: none"> <li>(1) describe key concepts in molecular biology and modern biotechnology using knowledge from cell biology, microbiology, biochemistry, immunology, omics and systems biology</li> <li>(2) apply laboratory techniques essential to modern molecular science</li> <li>(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues</li> <li>(5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment</li> <li>(6) equip with knowledge in chemistry, mathematics, statistics, or computer programming, with sufficient depth and breadth to apply these knowledge within a biological context.</li> <li>(7) solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically</li> </ul>	<ul style="list-style-type: none"> <li>(1) explain the basic scientific principles and methods</li> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> <li>(6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline</li> </ul>	<ul style="list-style-type: none"> <li>(1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning</li> </ul>
<ul style="list-style-type: none"> <li>(2) apply laboratory techniques essential to modern molecular science</li> <li>(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues.</li> <li>(5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment</li> <li>(7) solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically</li> </ul>	<ul style="list-style-type: none"> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(2) tackling novel situations and ill-defined problems</li> </ul>

Programme Learning Outcomes – Major in Molecular Biology & Biotechnology (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<p>(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues</p> <p>(7) solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically</p>	(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
<p>(3) communicate in written and oral communication skills and collaborate with other students effectively</p> <p>(6) equip with knowledge in chemistry, mathematics, statistics, or computer programming, with sufficient depth and breadth to apply these knowledge within a biological context.</p>	<p>(4) effectively communicate within and across the science disciplines</p> <p>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</p>	(4) intercultural communication, and global citizenship
<p>(3) communicate in written and oral communication skills and collaborate with other students effectively</p> <p>(7) solve a scientific question empirically by designing and implementing experiments, learning new experimental skills and tackling experimental errors, reporting results unbiasedly and systematically</p>	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
<p>(4) acquire scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate debated problems in the field and develop solutions, and appraise the related ethical issues</p> <p>(5) gain insights into real-life experience in the applications of biotechnology for human health, agriculture, and the environment</p>	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition

**Programme Learning Outcomes – Major in Physics (Intensive)**

**1. University Educational Aims**

Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:

- (1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning
- (2) tackling novel situations and ill-defined problems
- (3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics
- (4) intercultural communication, and global citizenship
- (5) communication and collaboration
- (6) leadership and advocacy for the improvement of the human condition

**2. Faculty Learning Outcomes**

Students completing the BSc curriculum should be able to:

- (1) explain the basic scientific principles and methods
- (2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines
- (3) apply scientific processes and knowledge in a wide variety of careers and professions
- (4) effectively communicate within and across the science disciplines
- (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines
- (6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline

**3. Programme Learning Outcomes – Major in Physics (Intensive)**

By the end of this programme, students should be able to:

- (1) identify and describe physical systems with their professional knowledge  
*(by means of coursework and tutorial classes in the curriculum)*
- (2) have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature  
*(by means of coursework, tutorial classes and laboratory works in the curriculum)*
- (3) analyze problems qualitatively and quantitatively based on a broad foundation of theoretical and experimental knowledge in physics, and appraise the related ethical issues  
*(by means of coursework, tutorial classes and research-based projects in the curriculum)*
- (4) communicate and collaborate with people of different background, culture, gender and nationality effectively in scientific issues  
*(by means of group project, tutorial session, presentation, exchange, internship and capstone opportunities in the curriculum)*
- (5) apply scientific and quantitative methods in tackling problems in research or real-world setting in an advanced level which can position them to pursue postgraduate studies in scientific and technical fields  
*(by means of projects, directed studies, local and foreign internships attached to universities, research centers, government bodies, NGOs and influential companies)*

#### 4. Mapping of Programme Learning Outcomes to Faculty Learning Outcomes to University Educational Aims

Due to the richness and diversity of the Major, multiple Programme and/or Faculty Learning Outcomes may be used to satisfy the Faculty Learning Outcomes and/or University Educational Aims.

Programme Learning Outcomes – Major in Physics (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
<ul style="list-style-type: none"> <li>(1) identify and describe physical systems with their professional knowledge</li> <li>(2) have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature</li> <li>(3) analyze problems qualitatively based on a broad foundation of theoretical and experimental knowledge in physics and quantitatively, and appraise the related ethical issues</li> <li>(5) apply scientific and quantitative methods in tackling problems in research or real-world setting in an advanced level which can position them to pursue postgraduate studies in scientific and technical fields</li> </ul>	<ul style="list-style-type: none"> <li>(1) explain the basic scientific principles and methods</li> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> <li>(6) integrate acquired discipline-specific knowledge in a science for professional and further academic pursuit in that discipline</li> </ul>	<ul style="list-style-type: none"> <li>(1) pursuit of academic/professional excellence, critical intellectual enquiry and life-long learning</li> </ul>
<ul style="list-style-type: none"> <li>(2) have developed their scientific intuition, abilities and techniques to tackle problems either theoretical or experimental in nature</li> <li>(3) analyze problems qualitatively based on a broad foundation of theoretical and experimental knowledge in physics and quantitatively, and appraise the related ethical issues</li> <li>(5) apply scientific and quantitative methods in tackling problems in research or real-world setting in an advanced level which can position them to pursue postgraduate studies in scientific and technical fields</li> </ul>	<ul style="list-style-type: none"> <li>(2) comprehend fundamental concepts in mathematics and the physical, chemical, biological and earth sciences, and understand the interconnectivity among the sciences and other disciplines</li> <li>(3) apply scientific processes and knowledge in a wide variety of careers and professions</li> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(2) tackling novel situations and ill-defined problems</li> </ul>
<ul style="list-style-type: none"> <li>(3) analyze problems qualitatively and quantitatively based on a broad foundation of theoretical and experimental knowledge in physics, and appraise the related ethical issues</li> </ul>	<ul style="list-style-type: none"> <li>(5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines</li> </ul>	<ul style="list-style-type: none"> <li>(3) critical self-reflection, greater understanding of others, and upholding personal and professional ethics</li> </ul>

Programme Learning Outcomes – Major in Physics (Intensive)	Faculty Learning Outcomes – BSc programme	University Educational Aims
By the end of this programme, students should be able to:	Students completing the BSc curriculum should be able to:	Benchmarked against the highest international standards, the 4-year undergraduate curriculum at HKU is designed to enable our students to develop their capabilities in:
(4) communicate and collaborate with people of different background, culture, gender and nationality effectively in scientific issues	(4) effectively communicate within and across the science disciplines (5) analyze scientific aspects of complex issues, and recognize and appraise moral and ethical issues within the sciences and related disciplines	(4) intercultural communication, and global citizenship
(4) communicate and collaborate with people of different background, culture, gender and nationality effectively in scientific issues	(4) effectively communicate within and across the science disciplines	(5) communication and collaboration
(3) analyze problems qualitatively and quantitatively based on a broad foundation of theoretical and experimental knowledge in physics, and appraise the related ethical issues (5) apply scientific and quantitative methods in tackling problems in research or real-world setting in an advanced level which can position them to pursue postgraduate studies in scientific and technical fields	(3) apply scientific processes and knowledge in a wide variety of careers and professions	(6) leadership and advocacy for the improvement of the human condition