

Neuroscience (Major/Minor)-For students admitted in or after 2016/2017

Important notes about choosing Neuroscience as second major or minor

- a. Declaration of Neuroscience major/minor is not available via the SIS during course selection period or add/drop period. Students who would like to declare major/minor in Neuroscience are required to submit an [application form](#) to the Department of Psychology one week before the end of add/drop period each semester. For the successful candidates, they will be informed by the respective faculties about the declaration result after add-drop period each semester.
- b. For enquiries, please contact Ms Joey Lau at ugpsyc@hku.hk

Neuroscience is an interdisciplinary subject. It is the study of the processes of the brain and nervous system, and their behavioral outcomes. This programme combines breadth of exposure to different fields and depth of learning experience in neuroscience study, it provides a fertile academic ground and significant academic advantage for students to further their studies and research in the neuroscience area, and eventually to translate their research findings into practical applications. Apart from the traditional neuroscience careers such as neuroscientist, neurologist, biological psychologist etc., there are other careers such as computer science, education, machine learning, artificial intelligence, public policy, medicine and pharmacology etc. benefit from a neuroscience perspective.

I. Objectives:

The mission of this Neuroscience programme is to provide high quality undergraduate education in neuroscience using a multi-disciplinary approach. This programme combines basic science with more specialized courses in neuroscience and psychology. Students can take this neuroscience programme as a second major, or as a minor in addition to their declared primary major. The objectives of the programme are set out below:

- a) provide students with exposure to and a fundamental understanding of neuroscience and its related fields in a multi-disciplinary approach
- b) develop students' ability to critically analyze scientific research
- c) equip students with basic theoretical and methodological training that enable their successful pursuit of further study at the postgraduate level in neuroscience or related disciplines
- d) enhance students' awareness of social issues as the neuroscience training will equip them with the background to understand controversies in neuroscience or related disciplines.

II. Programme Structure

Components	No. of Credits	
	Major	Minor
a) Introductory courses		
i) disciplinary	6	6
ii) pre-requisites*	12	-
b) Advanced courses		
iii) Core courses	18	18
iv) disciplinary electives	30	12
v) capstone experience	6	-

* Candidates who opt to declare two major programmes offered by the Faculty of Social Sciences should avoid selecting overlapping pre-requisites.

Notes:

- A course will be counted as fulfilling the major/minor requirement only if it is not taken as fulfilling another curriculum requirement.
- The major# option/minor option is open to all HKU undergraduates. Candidates are required to have Level 3/above in HKDSE Biology, Chemistry or Combined Science OR equivalent courses (subject to the approval from the Department of Psychology), before enrolling in the neuroscience core courses.
- It is preferable for the candidates to have knowledge in basic sciences or computer programming prior to the enrollment in neuroscience courses.

(#Neuroscience programme could only be taken as a multidisciplinary / second major)

Candidates who wish to declare a major (72 credits) or minor (36 credits) in Neuroscience must complete the following. In view of the pre-requisite requirements for advanced disciplinary electives which will have implications for students' course choice and study load, students should approach the Department of Psychology if they intend to declare the major/minor so that proper academic advising and mentoring can be given. Prior approval from the Department is required before students can declare the major/minor.

a) Introductory courses (18 credits for major, 6 credits for minor) ^{Note@}

i) Candidates must complete the following disciplinary course:
 PSYC1001. Introduction to psychology (6 credits)

ii) Pre-requisite courses (12 credits)

Candidates must complete two pre-requisite courses at introductory level from any faculties, bearing in mind the pre-requisite requirements for courses listed in the "Disciplinary Electives", and take the relevant pre-requisite courses as necessary. For non-BSocSc students, they shall select PSYC1004 Introduction to quantitative

methods in psychology to fulfill the pre-requisite requirement, and make up the rest 6 credits by taking any introductory course of which should be the pre-requisite course of an advanced course in neuroscience curriculum from any faculties.

Note@: Should there be an overlap of introductory courses for the two majors, candidates will be exempted from such requirements for neuroscience major and are required to make up any credit shortfall arising from such double-counting by taking disciplinary electives.

b) Advanced courses (54 credits for major, 30 credits for minor)

i) Core courses (18 credit for both major and minor)

PSYC2101. Foundations of neuroscience (6 credits)

PSYC2102. Seminar in neuroscience (6 credits)

PSYC3054. Human neuropsychology (6 credits)

ii) Disciplinary electives (30 credits for major, 12 credits for minor) ^{Note#}

Candidates who **major** in this programme must complete at least 30 credits from the course list below in which 18 credits must be from the stream of “Neuroscience electives” and the rest of the credits from “Other electives” and/or “Capstone experience”.

Candidates who **minor** in this programme must complete at least 2 elective courses of which one must be from the stream of “Neuroscience electives”. In the interest of deepening the understanding of subject matters taught in the field of Neuroscience, candidates who wish to minor in Neuroscience may also take the introductory course PSYC1004 Introduction to quantitative methods in psychology as free elective in addition to the completion of 2 disciplinary electives.

The following courses offered by different departments are grouped under two streams. Candidates who major/minor in Neuroscience are required to complete at least 30/12 credits of courses listed below with at least one course from each Stream and the courses selected must be offered by at least two different departments.

First Stream “Neuroscience electives”

PSYC2110. Developmental neuroscience (6 credits)

PSYC2111. Biological basis of psychological issues (6 credits)

PSYC2112. Research internship in neuroscience (6 credits) *

PSYC4101. Independent study in neuroscience (12 credits) *

*Internship/independent study (For major only)

Second Stream “Other electives”

BBMS3011. Molecular neuroscience (6 credits)

BIOL3105. Animal physiology & environmental adaptation (6 credits)

BBMS2003.	Human genetics (6 credits)
MEDE3501.	Medical imaging (6 credits)
PSYC2007.	Cognitive psychology (6 credits)
PSYC2051.	Perception (6 credits)

Note#: In course registration, students should pay special attention to the prerequisite of courses as specified in the syllabuses. They must complete relevant pre-requisite courses before taking corresponding disciplinary electives. In exceptional cases these maybe waived.

iii) Capstone experience (for major only)

Candidates who major in this programme must complete one of the following courses:

PSYC3061.	Advanced issues in perception (6 credits)
PSYC3068.	Advanced cognitive psychology (6 credits)
PSYC4102.	Capstone project in neuroscience (6 credits)

Course Descriptions for PSYC courses

PSYC1001. Introduction to psychology (6 credits)

Discussion of basic concepts in psychology and a preliminary survey of representative work carried out in various areas of psychological investigation, together with an investigation at some length of one such area.

Assessment: 100% coursework

PSYC2007. Cognitive psychology (6 credits)

This course covers how humans learn to deal with information from the environment. Topics include various aspects of perception, memory, concept structure and learning, and thinking. Students will be involved in conducting experiments on cognitive functioning as part of the coursework.

Assessment: 100% coursework

Prerequisites: PSYC1001 and PSYC1004

PSYC2051. Perception (6 credits)

An introduction to sensation and perception with an emphasis on the psychology of seeing. Specific topics include the following: examination of the functional properties of sensory systems (e.g., auditory system, color vision, vestibular system, touch and kinaesthesia); phenomenology of sensation and perception; psychophysical limits of perceptual systems; goals of sensory coding; structure and evolution of sensory systems; theories of perception. Perceptual experiments will be conducted by students in laboratory classes.

Assessment: 100% coursework
Prerequisite: PSYC1001

PSYC2101. Foundations of neuroscience (6 credits)

This course covers the fundamental principles of neuroscience. Topics include history of neuroscience, neurons and glia, neuronal membrane at rest, action potential, synaptic transmission, neuroanatomy, the somatic sensory system, chemical senses: taste and smell. the auditory system, vision and the eye, vision and the brain, spinal control of movement, brain control of movement, chemical control of the brain and behavior, development in the nervous system, memory systems, learning and memory: molecular biology, emotion and attention. (Priority will be given to students planning to major in neuroscience)

Assessment: 100% coursework
Prerequisite: PSYC1001

PSYC2102. Seminar in neuroscience (6 credits)

This course is a tutorial-based reading course in specialist areas of cognitive and behavioral neuroscience. It will include group presentations, in the context of organized formal debates, and in-depth group discussions of individual journal articles, providing an opportunity for students to examine critically the neuroscientific approach to understanding mind and behavior.

Assessment: 100% coursework
Prerequisite: PSYC2101

PSYC2110. Developmental neuroscience (6 credits)

Developmental neuroscience is an interdisciplinary research topic that integrates neuroscience, cognitive science and developmental science. This course aims to uncover the brain and neural mechanisms that underlie social, affective and cognitive development across the life span. Specific topics will include the introduction of theories and methods in developmental neuroscience, neuroplasticity, neural mechanisms that underlie the development of attention and perception processes, motor learning, memory, cognitive control, social-emotional processes. This course will examine these processes at different developmental stages, including infants, toddlers, adolescence and ageing population. This course will also cover the neural mechanisms underlying atypical development such as the Autism Spectrum Disorder (ASD).

Assessment: 70% coursework, 30% examination
Prerequisite: PSYC2101

PSYC2111. Biological basis of psychological issues (6 credits)

Human behavior is generated by complex psychophysiological mechanisms of the brain. This

course is designed to provide a broad introduction to the biological basis of stress, emotion, cognitive and affective regulation. Psychopathologies associated with impulse disinhibition and emotion dysregulation and will be examined as examples to demonstrate the complex relationships between brain, behavior, and psychopathology.

Assessment: 100% coursework

Prerequisite: PSYC1001

PSYC2112. Research internship in neuroscience (6 credits)

Students will have an opportunity to learn to do research as an intern in ongoing empirical research projects under a teacher's supervision in the Department of Psychology. Students spend 10-12 hours per week assisting various research activities. The internship includes participating in lab meetings or meeting individually with the supervisor, reading relevant theoretical and empirical articles, assisting in ongoing empirical research projects, and writing an internship report. Information about research projects offering internship placements and application procedure will be available in the Psychology Department webpage.

Assessment: 100% coursework

Prerequisite: PSYC2101

PSYC3054. Human neuropsychology (6 credits)

This course introduces basic principles of brain-behaviour relationships. Research methods for investigating brain-behavior relationships are reviewed. The neuro-anatomical and neuropsychological mechanisms underpinning various cognitive and affective processes as well as how these processes are dysregulated in some common brain disorders are discussed. Students will participate in an independent empirical research project. Priority will be given to UG students majoring in psychology.

Assessment: 100% coursework

Prerequisites: Either PSYC2101 or PSYC2022

PSYC3061. Advanced issues in perception (6 credits)

This advanced lab course explores findings from both recent and classical research on human perceptual systems. Specific attention will be given to - though not limited to - computational models, psychophysical findings, and neurobiological findings. Students will each do an independent empirical research project. Priority will be given to UG students majoring in psychology.

Assessment: 100% coursework

Prerequisites: PSYC1004 and PSYC2051.

PSYC3068. Advanced cognitive psychology (6 credits)

This course covers some of the more recent developments in cognitive psychology. Students

will learn about current issues in cognitive psychology by reading research articles. Topics may include consciousness, mental representations of objects/faces/letters, language, memory and decision making, as well as other topics reflecting the interests of the teacher. Students will each do an independent empirical research project. Priority will be given to UG students majoring in psychology.

Assessment: 100% coursework

Prerequisites: PSYC1004 and either PSYC2007 or PSYC2051.

PSYC4101. Independent study in neuroscience (12 credits)

(For neuroscience major) Students will each conduct an independent empirical research project. Regular attendance for research supervision is required. The project write-up should be about 8,000 to 10,000 words (exclusive of tables, bibliographies and appendices).

Assessment: 100% coursework

Prerequisites: PSYC1001 and PSYC1004 and PSYC2060 and PSYC2101

PSYC4102. Capstone project in neuroscience (6 credits)

This course comprises an independent research study in an area of neuroscience of the candidates' choice, subject to availability of supervision. Students will read within an area of study, to be agreed with their instructor, and write an extended essay or research proposal.

Assessment: 100% coursework

Prerequisite: PSYC2101

Course descriptions for Non-PSYC electives

BBMS2003. Human Genetics (6 credits)

To present an extensive introduction to the principles of genetics, illustrate how they operate in humans with examples, and discuss the applications of these in medical and clinical genetics. Topics include the Mendel's laws of genetics, the basic patterns of Mendelian inheritance in humans, the construction and the analysis of a pedigree, single gene and polygenic inheritance, multifactorial traits and heritability, cytogenetics, karyotypes, structural changes in chromosomes, and non-Mendelian inheritance. Concepts of genetic variations in human populations and Hardy-Weinberg equilibrium will also be presented.

Prerequisite: BBMS1001 or BIO1600

Assessment: 30% continuous assessment; 70% examination.

BBMS3011. Molecular Neuroscience (6 credits)

This is an advanced course aiming to provide students with the latest frontier on molecular and cellular mechanisms that underlie the structure and function of the central nervous system. This interdisciplinary course covers fundamental concepts on the molecular basis of brain functions during development and aging, and discusses how dysregulation of these processes might lead to various brain disorders. Topics include axon guidance, synaptic transmission, formation and plasticity of synapses, learning and memory, and diseases of the nervous systems such as cognitive and emotional disturbance. Lectures and research-oriented practical training are emphasized so as to expose students to different research areas in molecular neuroscience.

Prerequisite: BBMS2006

Assessment: 50% continuous assessment; 50% examination.

BIOL3105. Animal physiology & environmental adaptation (6 credits)

The course covers the major aspects of animal physiology for environmental adaptation in terrestrial & aquatic habitats. Stress will be given to the functional interactions between animals and the environment, especially on the mechanisms by which animals obtain resources for survival from the environment, detect environmental changes via sensory structures, and respond to adversities in the environment by altering their body forms & functions.

Prerequisite: BIOL2103 or BIOL2220 or BIO2600

Assessment: 25% continuous assessment; 75% examination.

MEDE3501. Medical imaging (6 credits)

Medical imaging is an indispensable technology in modern healthcare and biomedical research. It provides in vivo anatomical, physiological and functional information of the human body in normal, developing and pathological states. The rapid development in this field not only leads to better disease diagnosis and more accurate treatment efficacy assessment, but also paves the way for better understanding of living biological systems.

This course will focus mainly on the principles of conventional (X-ray and Ultrasound) and modern (Computerized Tomography – CT; Magnetic Resonance Imaging – MRI; Nuclear Imaging and Optical Imaging) imaging techniques applied to biological systems and in medical diagnoses and the interpretations of these images.

At the end of the course, students should gain a clear understanding in the physics, working principles and mathematics involved in the various imaging modalities covered. They should also be able to appreciate the interdisciplinary nature of the subject and learn the latest development or advancement in the field of medical imaging.

Pre-requisite: MEDE2500 or MEDE2201 or MEDE2203 or ELEC3241

Assessment: 20% practical work, 10% continuous assessment, 70% examination

April 2017

The University of Hong Kong
Department of Psychology
Scenarios for Neuroscience Major option (Students are required to complete at least 72 credits)

	Psychology Major Students ^a	No. of credits	Non-Psychology Major Students	No. of credits
Year I	Introductory discipline course PSYC1001	0 ^a	Introductory discipline course PSYC1001	6
	TWO Introductory pre-requisite courses^b, e.g. 1) pre-requisites of BIOL3105 ¹ 2) pre-requisites of BBMS3011 ² 3) pre-requisite of BBMS2003 ³ 4) pre-requisite of MEDE3501 ⁴ 5) other introductory courses from any faculties ⁶	12	TWO Introductory pre-requisite courses^b, e.g. 1) pre-requisites of BIOL3105 ¹ 2) pre-requisites of BBMS3011 ² 3) pre-requisite of BBMS2003 ³ 4) pre-requisite of MEDE3501 ⁴ 5) pre-requisite of PSYC4101 independent study in neuroscience ⁵ 6) other introductory courses from any faculties ⁶ <i>(Non-BSoSc students shall take PSYC1004 as one of the introductory pre-requisite courses.)</i>	12
Sub-total		12		18
Year II	TWO Advanced core courses PSYC2101 Foundations of neuroscience and PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	12	TWO Advanced core courses PSYC2101 Foundations of neuroscience and PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	12
	TWO Advanced disciplinary electives listed under "First Stream" or "Second Stream" ^c	12	ONE Advanced disciplinary elective listed under "First Stream" or "Second Stream" ^c	6
Sub-total		24		18
Year III	ONE Advanced core course PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	6	ONE Advanced core course PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	6
	TWO Advanced disciplinary electives listed under "First Stream" and/or "Second Stream" ^c	12	TWO Advanced disciplinary electives listed under "First Stream" and/or "Second Stream" ^c	12
Sub-total		18		18
Year IV	ONE/TWO Advanced disciplinary electives^d listed under "First Stream" and/or "Second Stream" ^c	12	ONE/TWO Advanced disciplinary electives^d listed under "First Stream" and/or "Second Stream" ^c	12
	Capstone Experience PSYC3061 or PSYC3068 or PSYC4102 Capstone project in neuroscience	6	Capstone Experience PSYC3061 or PSYC3068 or PSYC4102 Capstone project in neuroscience	6
Sub-total		18		18
Total		72		72

The programme syllabus is available at the department website at http://www.psychology.hku.hk/~main/?page_id=1619 (Click "Programme Information" → "Neuroscience (Major/Minor).")

Remarks

- a** Psychology major students had already taken PSYC1001 for Psychology major curriculum, you are required to make up credit shortfall arising from such double-counting by taking one 6-credit disciplinary elective.
- b** Students should bear in mind the pre-requisite requirements for courses listed in the "Disciplinary Electives" (See below courses), and take the relevant requisite courses as necessary. Students are reminded to take note that you may need to use 6 to 18 credits for taking relevant pre-requisite(s) which are counted as free elective(s) outside neuroscience curriculum. However, if you have already completed the pre-requisite(s) concerned at you first major, the implication of pre-requisite requirements in Neuroscience Major on students' course selection and study load would be minimized.)
1. Pre-requisites of BIOL3105: BIOL2103/BIOL2220/BIOC2600 [(Pre-requisites of BIOL2103&BIOL2220: BIOL1110) & (Pre-requisite of BIOC2600: BIOC1600/BIOL1110/ENGG1207)]
 2. Pre-requisites of BBMS3011: BBMS2006(Pre-requisite of BBMS2006: BBMS1001)
 3. Pre-requisite of BBMS2003: BBMS1001/BIOC1600
 4. Pre-requisite of MEDE3501: MEDE2500/MEDE2201/MEDE2203/ELEC3241
 5. Pre-requisites of PSYC4101 Independent study in neuroscience: PSYC2060[#] and PSYC2101-Foundation of neuroscience (Pre-requisites of PSYC2060: PSYC1001 and PSYC1004)
- [# A waiver on pre-requisite course (PSYC2060) will be granted for students taking [PSYC4101 Independent Study in Neuroscience] if the students have taken similar research methods course in their first major (equivalent to PSYC2060). Students shall approach the Department of Psychology for application.]*
6. Students must complete two prerequisite courses at introductory level, and the taking of such courses is subject to academic advising and prior approval of the Department of Psychology. First and foremost, these 12 credits must be utilized to fulfill the prerequisite requirements of "Disciplinary Electives", and also to ensure that all components of the major are academically coherent
- c** For selection of disciplinary electives under "Second Stream", students should select at least one course that is not from the Department of Psychology
- d** Each course carries 6 credits, however, if students take PSYC4101 Independent Study in Neuroscience, the course carries 12 credits

Aug-17

Scenarios for Neuroscience Minor option (Students are required to complete at least 36 credits)

	Psychology Major Students ^a	No. of credits	Non-Psychology Major Students	No. of credits
Year I	<u>Introductory discipline course</u> PSYC1001	0 ^a	<u>Introductory discipline course</u> PSYC1001	6
Sub-total		0		6
Year II	<u>TWO Advanced core courses</u> PSYC2101 Foundations of neuroscience and PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	12	<u>TWO Advanced core courses</u> PSYC2101 Foundations of neuroscience and PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	12
Sub-total		12		12
Year III	<u>ONE Advanced core course</u> PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	6	<u>ONE Advanced core course</u> PSYC2102 Seminar in neuroscience or PSYC3054 Human neuropsychology	6
	<u>ONE Advanced disciplinary elective^b listed under</u> "First Stream" or "Second Stream" ^c	6	<u>ONE Advanced disciplinary elective^b listed under</u> "First Stream" or "Second Stream" ^c	6
Sub-total		12		12
Year IV	<u>TWO Advanced disciplinary electives^b listed under</u> "First Stream" or "Second Stream" ^c	12	<u>ONE Advanced disciplinary elective^b listed under</u> "First Stream" or "Second Stream" ^c	6
Sub-total		12		6
Total		36		36

The programme syllabus is available at the department website at http://www.psychology.hku.hk/~main/?page_id=1619 (Click "Programme Information" → "Neuroscience (Major/Minor).")

Remarks

- a** Psychology major students had already taken PSYC1001 for Psychology major curriculum, you are required to make up credit shortfall arising from such double-counting by taking one 6-credit disciplinary elective.
- b** Students should bear in mind the pre-requisite requirements for courses listed in the "Disciplinary Electives" (See below courses), and take the relevant requisite courses as necessary. Students are reminded to take note that you may need to use 6 to 12 credits for taking relevant pre-requisite(s) which are counted as free elective(s) outside neuroscience curriculum. However, if you have already completed the pre-requisite(s) concerned at your first major, the implication of pre-requisite requirements in Neuroscience Major on students' course selection and study load would be minimized.)
1. Pre-requisites of BIOL3105: BIOL2103/BIOL2220/BIOC2600 [(Pre-requisites of BIOL2103&BIOL2220: BIOL1110) & (Pre-requisite of BIOC2600: BIOC1600/BIOL1110/ENGG1207)]
 2. Pre-requisites of BBMS3011: BBMS2006(Pre-requisite of BBMS2006: BBMS1001)
 3. Pre-requisite of BBMS2003: BBMS1001/BIOC1600
 4. Pre-requisite of MEDE3501: MEDE2500/MEDE2201/MEDE2203/ELEC3241
- c** For students minoring in Neuroscience, you are required to select 1 disciplinary elective from First Stream and 1 elective from Second Stream. Students shall not take all electives (12 credits) from one single department.
- d** Each course carries 6 credits, unless specified otherwise.