Academic Year: 2021 - 2022
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Important Message

The information provided here is for reference and may be subject to change by the course coordinator(s) or the offering department(s) concerned.

Section A: Course Information

BBMS3011 - Molecular Neuroscience

Faculty LKS Medical Faculty

Department

Description
School of Biomedical Sciences

Course Coordinator

Name	Faculty/ Department	Email Address
Dr CSW Lai	School of Biomedical Sciences	coraswl@hku.hk
Prof YS Chan	School of Biomedical Sciences	yschan@hku.hk

Credit Value 6.00

Course Grade A+ to F

Semester Offered First Semester

Prerequisite(s)/ Corequisite(s)/Impermissible Combination(s)

Pass in any one of the following courses: BBMS1001, BIOL1110, BIOC2600, BIOL2220, BMED2302/MEDE2302, PSYC2101, PSYC2110

Approved Syllabus

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. Latest techniques in neuroscience research, such as the use of viral-mediated expression of transgenes, optogenetics, chemogenetics, and induced pluripotent stem cells, will be introduced. Lectures tutorials, presentation of research papers and research-oriented practical training are emphasized so as to expose students to different areas in molecular neuroscience through multiple learning activities.

Prerequisite: Pass in any one of the following courses: BBMS1001 Introduction to Human Anatomy and Physiology, BIOL1110 From Molecules to Cells, BIOC2600 Basic Biochemistry, BIOL2220 Principles of Biochemistry, BMED2302/MEDE2302 Life Sciences II (Cell Biology & Physiology), PSYC2101 Foundations of Neuroscience, PSYC2110 Developmental Neuroscience

Assessment: 50% continuous assessment; 50% examination.

Course Objectives

To introduce students with the major molecular mechanisms and signaling pathways that control brain development and functioning, and link between the dysregulated mechanisms and disease conditions
To introduce the common experimental approaches and new techniques in molecular neuroscience research
To allow students to participate in the interpretation and dissemination of neuroscience knowledge

Section B: Teaching/ Learning

Course Type Lecture course

Course Learning Outcomes

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Academic Plan BBiomedSc (4)

	On completing the course, students will be able to	Alignment with Programme Learning Outcomes
1	[SN: 001] 1) describe the major molecular pathways that control brain development and functioning, and the pathophysiological processes under disease conditions; develop scientific inquiry and critical thinking skills, including the ability to understand and evaluate the key concepts and emerging experimental approaches in molecular neuroscience; apply the core knowledge and skills for the pursuit of research related to the molecular mechanisms of brain development and functioning, as well as the pathophysiological basis of various brain diseases; and critically review research literature.	[SN: 00001] Students should be able to demonstrate solid knowledge of biomedical sciences. [SN: 00002] Students should be able to develop scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate problems in order to develop solutions. [SN: 00003] Students should be able to apply the core knowledge and skills for the pursuit of biomedical sciences research. [SN: 00004] Students should be able to evaluate research literature. [SN: 00005] Students should be able to make rational hypotheses about ill-defined biomedical sciences problems based on the best available data and evidence. [SN: 00008] Students should be able to understand broader concepts of molecular and health sciences and be able to relate these to scientific issues of cultural, regional and global significance. [SN: 00011] Students should be able to appreciate the role of biomedical sciences in the improvement of human conditions.
2	[SN: 002] - to formulate testable hypotheses that can unravel the development and physiological function of the nervous system, as well as the pathophysiological mechanisms that underlie disease conditions, based on the best available data and evidence; and - identify potential approaches or research that will lead to conceptual advance in understanding the molecular mechanisms of brain development and functioning, as well as the molecular basis of brain disorders.	[SN: 00001] Students should be able to demonstrate solid knowledge of biomedical sciences. [SN: 00002] Students should be able to develop scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate problems in order to develop solutions. [SN: 00003] Students should be able to apply the core knowledge and skills for the pursuit of biomedical sciences research. [SN: 00004] Students should be able to evaluate research literature. [SN: 00005] Students should be able to make rational hypotheses about ill-defined biomedical sciences problems based on the best available data and evidence. [SN: 00006] Students should be able to identify potential approaches or research that will lead to the advancement in biomedical sciences.
3	[SN: 003] - apply concepts of molecular neuroscience to scientific issues of regional and global health problems.	[SN: 00001] Students should be able to demonstrate solid knowledge of biomedical sciences. [SN: 00002] Students should be able to develop scientific inquiry and critical thinking skills, including the ability to understand, analyze, and evaluate problems in order to develop solutions. [SN: 00003]

		Students should be able to apply the core knowledge and skills for the pursuit of biomedical sciences research. [SN: 00004] Students should be able to evaluate research literature. [SN: 00005] Students should be able to make rational hypotheses about ill-defined biomedical sciences problems based on the best available data and evidence. [SN: 00006] Students should be able to identify potential approaches or research that will lead to the advancement in biomedical sciences. [SN: 00007] Students should be able to engage in relevant and realistic self-appraisal as biomedical scientists and realize one's own capabilities and limitations. [SN: 00008] Students should be able to understand broader concepts of molecular and health sciences and be able to relate these to scientific issues of cultural, regional and global significance. [SN: 00009] Students should be able to communicate and collaborate effectively with scientific peers and healthcare professionals orally and in writing. [SN: 00010] Students should be able to understand the importance of ethics and integrity of scientific research, and respect the roles and contributions of other members of the team and display capacity for team work. [SN: 00011] Students should be able to appreciate the role of biomedical sciences in the improvement of human conditions. [SN: 00012] Students should be able to participate in the generation, interpretation, application and dissemination of biomedical sciences knowledge which will improve the quality of healthcare.
4	[SN: 004] - communicate and collaborate effectively with scientific peers orally and in writing; and - participate actively and constructively in team work. - work in an ethical manner, displaying high personal integrity when collecting data and communicating scientific information.	[SN: 00001] Students should be able to demonstrate solid knowledge of biomedical sciences.
5	[SN: 005] - articulate the role of molecular neuroscience research in the improvement of human conditions; and - participate in the generation, interpretation, application and dissemination of neuroscience knowledge which will improve the quality of healthcare.	[SN: 00001] Students should be able to demonstrate solid knowledge of biomedical sciences.

Course Teaching and Learning Activities

Description	Aprrox. number of hours (for normative student)	% of total study load
Tutorials- contact hours	6.00	4.29
Lectures- contact hours	22.00	15.71
Assessment	12.00	8.57
Reading / Self study	100.00	71.43
Total	140.00	100.00

Assessment Methods and Weighting

Assessment methods	Weighting in final course grade (%)
Examination	50.00
Presentation	30.00
Tests	20.00
Total	100.00
Coursework/Examination Ratio	50.00% / 50.00%

Assessment Methods and Assignment

	Assessment Methods and Assignment	Alignment with Course Learning Outcomes
1	Examination : Exam	[SN: 001] 1) describe the major molecular pathways that control brain development and functioning, and the pathophysiological processes under disease conditions; develop scientific inquiry and critical thinking skills, including the ability to understand and evaluate the key concepts and emerging experimental approaches in molecular neuroscience; apply the core knowledge and skills for the pursuit of research related to the molecular mechanisms of brain development and functioning, as well as the pathophysiological basis of various brain diseases; and critically review research literature. [SN: 002] - to formulate testable hypotheses that can unravel the development and physiological function of the nervous system, as well as the pathophysiological mechanisms that underlie disease conditions, based on the best available data and evidence; and - identify potential approaches or research that will lead to conceptual advance in understanding the molecular mechanisms of brain development and functioning, as well as the molecular basis of brain disorders. [SN: 003] - apply concepts of molecular neuroscience to scientific issues of regional and global health problems.
2	Presentation : Individual presentation	[SN: 002] - to formulate testable hypotheses that can unravel the development and physiological function of the nervous system, as well as the pathophysiological mechanisms that underlie disease conditions, based on the best available data and evidence; and - identify potential approaches or research that will lead to conceptual advance in understanding the molecular mechanisms of brain development and functioning, as well as the molecular basis of brain disorders. [SN: 003] - apply concepts of molecular neuroscience to scientific issues of regional and global health problems.
3	Tests	[SN: 001] 1) describe the major molecular pathways that control brain development and functioning, and the pathophysiological processes under disease conditions; develop scientific inquiry and critical thinking skills, including the ability to understand and evaluate the key concepts and emerging experimental approaches in molecular neuroscience; apply the core knowledge and skills for the pursuit of research related to the molecular mechanisms of brain development and functioning, as well as the pathophysiological basis of various brain diseases; and critically review research literature. [SN: 002] - to formulate testable hypotheses that can unravel the development and physiological function of the nervous system, as well as the pathophysiological mechanisms that underlie disease conditions, based on the best available data and evidence; and - identify potential approaches or research that will lead to conceptual advance in understanding the molecular mechanisms of brain development and functioning, as well as

	the molecular basis of brain disorders. [SN: 003] - apply concepts of molecular neuroscience to scientific issues of regional and global health problems.

Course Grade Descriptors Browse course grade descriptors

Course URL Nil

Related Major/ Minor/ Professional Core

Description	Associated Credit Unit Statement
BBiomedSc (4)	Nil

Section C: Course Schedule

Course Schedule for this year 2021-22

Semester	Session	Start Date	End Date	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Start Time	End Time	Venue	Teaching Staff
2021-22 Sem 1	1A-LEC (1887)	02/09/2021	07/10/2021	☐	☐	☐	☑	☐	☐	☐	03:30 PM	05:20 PM	MB151	Chi Hang Cheung Chi Wai Lee Chuen Chung Chang King Ho Cheung Kwok Yan Shum Lee Wei Lim Sau Wan Lai Ying Shing Chai
2021-22 Sem 1	1A-LEC (1887)	07/09/2021	30/11/2021	☐	☑	☐	☐	☐	☐	☐	09:30 AM	11:20 AM	JLG03	Chi Hang Cheung Chi Wai Lee Chuen Chung Chang King Ho Cheung Kwok Yan Shum Lee Wei Lim Sau Wan Lai Ying Shing Chai
2021-22 Sem 1	1A-LEC (1887)	21/10/2021	25/11/2021	☐	☐	☐	☑	☐	☐	☐	03:30 PM	05:20 PM	MB151	Chi Hang Cheung Chi Wai Lee Chuen Chung Chang King Ho Cheung Kwok Yan Shum Lee Wei Lim

Sau Wan Lai

Ying Shing Chai

Note: Teaching staff information will be printed once they are finalised.

Section D: Additional Course Information

Note: Information about course content and reading materials listed below is extracted from Moodle at scheduled intervals. Please refer to Moodle for up-to-date information.

Course Content and Topics

- Molecular Developmental Neurobiology - Formation of the brain
- Molecular Developmental Neurobiology – Neurogenesis
- Molecular guidance cues in growth cone steering and axonal guidance
- Molecular mechanisms of activity-dependent remodeling in topographic mapping
- Neuronal migration in neocortex
- Glial cell biology
- Cellular and molecular mechanisms governing neuromuscular synapse development
- Molecular architecture of neuronal synapse in the brain
- Neurotransmitters and their receptors
- Pre- and post-synaptic mechanisms of synaptic plasticity
- Synaptic plasticity: receptor trafficking and dendritic spine remodeling
- Synaptic plasticity: transcription and protein synthesis
- Learning and memory: an overview
- Advanced techniques in studying learning and memory
- Synapse dysfunction and autism
- Molecular basis of depression and schizophrenia
- Molecular mechanisms underlying neuropathic pain
- Neurovascular interactions for neuronal function in health and disease
- Signaling cascades regulating neuronal death
- Neurodegeneration: an overview
- Molecular mechanisms of Neurodegeneration
- Human stem cell-derived neuron to study brain disorders

Required/ Recommended Readings and Online Materials

TBC

Course Effectiveness Profile

	Academic Year	Academic Career	Enrollment #	Response #	Response Rate (%)	Mean Course Effectiveness	Course Coordinator's Comments
1	2019	UG	23	5	21	70.0	
2	2019	TPG	1	1	10	100.0	
3	2018	UG	7	5	71	80.0	
4	2017	UG	14	3	21	83.3	

Note: If the number of response is less than 6, "Mean Course Effectiveness" will be masked. For further details, please refer to Operational Guide for Student Feedback on Teaching & Learning.

Section E: University Information

Academic Misconduct and Plagiarism

Academic honesty

The University highly values honesty in the academic work submitted by students, and adopts a policy of zero tolerance on cheating in examinations and plagiarism in any work submitted for assessment. Any student who commits such an academic offence is liable to be considered by the University's Disciplinary Committee for possible disciplinary action which can result in serious consequences - including expulsion from the University.

Plagiarism is copying the work of another person without proper acknowledgement. There are two parts in the definition: copying and the absence of proper acknowledgement. As a result, it gives an impression to an ordinary reader that the work is the original work of the author

when in fact it was copied from some others' work. Copying does not necessarily only mean copying word for word. Closely paraphrasing or substantial copying with minor modifications (such as changing grammar, adding a few words or reversing active/passive voices) is still copying for this purpose. It does not matter what the nature of the source is: it may be a book, an article, lecture notes or simply an assignment of another student, or in electronic form such as a website, an audio-visual production or other non-textual material, to name but a few. It does not matter whether the source has been published or not. Plagiarism covers any form of work submitted for assessment, including theses, dissertations, take-home examinations, assignments, projects and other forms of coursework.

Students are strongly advised to read the booklets "What is Plagiarism?" (http://www.hku.hk/plagiarism/) and "Plagiarism and How to Avoid it" (http://www4.caes.hku.hk/plagiarism/) and to consult your teachers if you have any questions on the definition of plagiarism and how to avoid it. Students are also advised to familiarise themselves with issues in relation to copyright as publicized in the section on "Copyright and Plagiarism" in the Student Handbook (http://www.handbook.hku.hk/ug/). These guidelines cover lecture notes, course materials, photocopies, internet materials as well as dissertations.

Students should read these guidelines carefully and revisit them from time to time.

University Assessment Policy

Please refer to the University Assessment Policy available online.

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