BASc in
Applied Artificial Intelligence

Syllabuses and Regulations

2020-2021

Faculty of Science
The University of Hong Kong

SECTION I Aim and Learning Outcomes

Degree : Bachelor of Arts and Sciences in Applied Artificial Intelligence

Aim : The aim of this curriculum that spans across Architecture, Engineering, Science and Social Sciences is to recruit excellent students, equip them with theoretical foundations of artificial intelligence, as well as the necessary problem-solving (both qualitative and quantitative) and analytical skills, and nurture them to transfer interdisciplinary scientific knowledge into a wide range of integrated applications and technological innovations, generating in the process valuable practical experiences.

Learning Outcomes of Applied AI Programme

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

(1) apprehend the concepts of artificial intelligence and its underlying theory in relation to a broad range of related disciplinary areas
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(2) be proficient with artificial intelligence techniques, and offer effective recommendations for innovative initiatives and solutions
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(3) acquire the necessary critical thinking, creative problem solving and communication skills for effective work and collaboration
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(4) communicate to people effectively and efficiently with professionalism and accuracy
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

(5) gain insights into current advances and comprehensive knowledge of artificial intelligence to solve real-life problems
(by means of coursework and tutorial classes and/or research-based project in the curriculum)

SECTION II Credit Unit Statement of the BASc(AppledAI) Degree Curriculum

1. General guideline for contact hour requirement in the BASc(AppliedAI) Degree Curriculum

(a) A 6-credit course has around 120 total study hours, including contact hours, study time, assignment and assessment.
(b) About 30% of the total study hours are actual contact hours in the form of a class, e.g. lecture and tutorial/discussion hours.
(c) A 6-credit course has around 24-36 lecture hours.
(d) For lecture-based courses, normally there will be tutorial/discussion sessions.
(e) For courses employing a non-lecture or lab-based approach, e.g. IT-based or project-based courses, students are expected to devote about 120-180 hours for a 6-credit course, and 240-360 hours for a 12-credit course.

2. Credit Unit Statement of the BASc(AppliedAI) Degree Curriculum

The BASc(AppliedAI) degree curriculum consists of three major types of courses based on the learning activities. The majority of courses in the programmes are 6 credits. Examples of the contact hour requirements for the three categories of courses are described as follows.

(a) Lecture-based courses (6 credits)
Contact hours: 24-36 hours of lectures and/or tutorials for 6 credits
These courses are taught predominantly by lectures and tutorials. Assessment is by a combination of examination (0-75%) and continuous assessment (25-100%). Continuous assessment tasks include written assignments (totaling no more than 8,000 words) such as essays and project reports, and oral presentations. The requirement for a 3-credit lecture-based course will be about one-half of that of a 6-credit lecture-based course. Details of the assessment tasks can be found in the description of individual courses.

(b) Lecture with laboratory component courses (6 credits)
Contact hours for 30-36 hours of lectures and/or tutorial
These courses are taught by a combination of lectures and laboratory/practical sessions. Assessment is by a combination of examination (0-50%) and continuous assessment (50-100%). Continuous assessment tasks include coursework (totalling no more than 8,000 words) such as assignments, essays, laboratory reports, and project reports, and oral presentations. Details of the assessment tasks can be found in the description of individual courses.

(c) Project-based courses (6 and 12 credits)
These courses aim at providing students with an opportunity to pursue their own research interest under the supervision of a teacher. The teacher normally meets with the student weekly to discuss project progress. Assessment task is normally through research reports or a dissertation (totalling no more than 10,000 words for a 6-credit course and 20,000 words for a 12-credit course). Oral presentation will form part of the assessment. Details of the assessment tasks can be found in the description of individual courses.

SECTION III List of BASc(AppliedAI) Courses* on offer in 2020/2021 and 2021/2022^

Course Code	Title	Credit	Pre-requisite	Available in		Semester offered in 2020 - 2021	Exam. held in 2020 - 2021	Quota	Course Coordinator	Major / Minor *(The Major/Minor that this course appears as.)*			
				2020 - 2021	2021 - 2022	0=year long 1=1st sem 2=2nd sem S=Summer				*Disciplinary Core Course*	*Disciplinary Elective*	*Capstone - Disciplinary Core Course*	*Capstone - Disciplinary Elective*
Centre for Applied English Studies													
CAES1000	Core University English	6	NIL	Y	Y	1, 2	No exam	---	Dr P Wong, English				
CAES9821	Professional and technical communication for mathematical sciences	6	NIL	Y	Y	1, 2	No exam	---	Mr S D Boynton, English				
School of Chinese													
CSCI9001	Practical Chinese for science students	6	NIL	Y	Y	1, 2	Dec, May	---	Mr K W Wong, Chinese				
Department of Mathematics													
MATH1013	University mathematics II	6	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1009 or MATH1011; and Not for students who have passed MATH1821, or (MATH1851 and MATH1853), or have already enrolled in this course.	Y	Y	1, 2	Dec, May	500	Dr C W Wong, Mathematics	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)	Major in Chemistry (Intensive) (2020,2019,2018,2017, 2016,2015); Major in Molecular Biology & Biotechnology (Intensive) (2020,2019,2018,2017, 2016,2015); Major in Physics (Intensive) (2020,2019,2018,2017, 2016); Minor in Actuarial Studies (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH2014	Multivariable calculus and linear algebra	6	Pass in MATH1013 or (MATH1851 and MATH1853). Not for students who have passed MATH2822 or [(MATH2101 or MATH2102) and MATH2211], or have already enrolled in these courses.	Y	Y	1, 2	Dec, May	---	Dr H Y Zhang, Mathematics	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014);	Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015); Minor in Mathematics (2020,2019,2018,2017, 2016,2015); Minor in Operations Research & Mathematical Programming		

* This list only includes courses offered by the Department of Statistics & Actuarial Science and the Department of Mathematics and language courses.
^ Availability of courses in 2021-2022 is subject to change.

										Major in Statistics (2020,2019,2018,2017, 2016,2015,2014)	(2020,2019,2018,2017, 2016,2015)		
MATH3601	Numerical analysis	6	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822)	Y	Y	1	Dec	---	Dr Z Zhang, Mathematics	Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH3901	Operations research I	6	Pass in MATH2014 or MATH2101 or MATH2102	Y	Y	1	Dec	---	Dr Z Qu, Mathematics	Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH3904	Introduction to optimization	6	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822)	Y	Y	1	Dec	---	Prof W Zang, Mathematics	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)	Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH3906	Financial calculus	6	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822) or STAT2601	Y	Y	2	May	---	Dr G Li, Mathematics	Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013);		

											Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH3911	Game theory and strategy	6	Pass in (MATH2101 and MATH2211) or (MATH1821 and MATH2822)	Y	Y	2	May	---	Dr K H Law, Mathematics		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Computational & Financial Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)		
MATH3943	Network models in operations research	6	Pass in (MATH2101 and MATH2211) or MATH2014; and Pass in MATH3901, or already enrolled in this course.	N	Y	---	---	---	Prof W Zang, Mathematics		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Mathematics (Intensive) (2020,2019,2018,2017, 2016); Major in Mathematics/Physics (2017,2016,2015,2014, 2013); Minor in Mathematics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Operations Research & Mathematical Programming (2020,2019,2018,2017, 2016,2015,2014,2013)		

Department of Statistics & Actuarial Science													
APAI1001	Artificial intelligence: foundation, philosophy and ethics	6	For BASc(AppliedAI) students only.	Y	Y	1	Dec	20	Prof J J F Yao, Statistics & Actuarial Science	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)			
APAI3001	Deep learning	6	TBC	N	Y	---	---	---	TBC	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)			
APAI3010	Image processing and computer vision	6	TBC	N	Y	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI3021	Modern biostatistics	6	TBC	N	Y	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI3799	Directed studies in Applied AI	6	TBC	N	Y	---	---		TBC				Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)
APAI4011	Natural language processing	6	TBC	N	Y	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI4012	High-performance computing	6	TBC	N	N	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI4022	Omics data analysis	6	TBC	N	Y	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI4023	Medical image analysis	6	TBC	N	N	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		
APAI4099	Special topics of applied AI	6	TBC	N	N	---	---		TBC		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2020,2020,2020,2020,2019,2019,2019,2019,2019)		
APAI4766	Applied AI internship	6	TBC	N	Y	---	---		TBC				Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)
APAI4798	Applied AI project	12	TBC	N	Y	---	---		TBC				Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)
STAT2601	Probability and statistics I	6	Pass or already enrolled in MATH2014, or (MATH2101 and MATH2211), for students admitted in 2014 or thereafter; or Pass in MATH1013, or already enrolled in this course, for students admitted in 2013 or before; or Pass in MATH1851 and MATH1853, for students admitted in 2013 or before; and	Y	Y	1, 2	Dec, May	---	Dr K P Wat, Statistics & Actuarial Science	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017,2016,2015,2014,2013); Major in Risk Management (2020,2019,2018,2017,	Minor in Actuarial Studies (2020,2019,2018,2017,2016,2015,2014,2013); Minor in Risk Management (2020,2019,2018,2017,2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017,		

			Not for students who have passed in STAT1603, or already enrolled in this course; Not for students who have passed in STAT2901, or already enrolled in this course; and Not for BSc(ActuarSc) students.							2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)	2016,2015,2014,2013)		
STAT2602	Probability and statistics II	6	Pass in STAT2601; and Not for students who have passed in STAT3902, or already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr K Zhu, Statistics & Actuarial Science	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)	Minor in Actuarial Studies (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT3600	Linear statistical analysis	6	Pass in STAT2602; and Not for students who have passed in STAT3907, or have already enrolled in this course.	Y	Y	1, 2	Dec, May	---	Dr C Wang, Statistics & Actuarial Science	Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT3612	Statistical machine learning	6	Pass in STAT2602 or (STAT1603 and any University level 2 course) or STAT3902; and Pass in STAT3600 or STAT3907, or already enrolled in these courses; and Not for students who have passed in STAT4904, or already enrolled in this course; and Not for BSc(Actuarial Science) students. BSc(Actuarial Science) students are advised to take STAT4904 Statistical learning for risk modelling instead.	Y	Y	1	No exam	---	Dr A J Zhang, Statistics & Actuarial Science	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013)	BSc in Actuarial Science (2017,2016,2015,2014, 2013); Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT3613	Marketing analytics	6	Pass in BIOL2102 or (ECON1280 and any University level 2 course) or (STAT1601 and any University level 2 course) or (STAT1602 and any University level 2 course) or STAT2601 or (STAT1603 and any University level 2 course) or STAT2901	Y	Y	1	Dec	50	Dr C W Kwan, Statistics & Actuarial Science		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT3622	Data visualization	6	Pass in STAT2602 or STAT3902	Y	N	2	No exam	50	Prof G Yin, Statistics & Actuarial Science		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017,			

											2016,2015,2014,2013)		
STAT3955	Survival analysis	6	Pass in STAT3902, or already enrolled in this course; or Pass in STAT3600 or STAT3901; Not for students who have passed in STAT3955, or already enrolled in this course.	N	N	---	---	---	Dr J F Xu, Statistics & Actuarial Science		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2019); BSc in Actuarial Science (2019,2018,2017,2016, 2015,2014,2013); Major in Statistics (2019,2018,2017,2016, 2015,2014,2013); Minor in Statistics (2019,2018,2017,2016, 2015,2014,2013)		
STAT4601	Time-series analysis	6	Pass in STAT3600; and Not for students who have passed in STAT3614, or have already enrolled in this course; and Not for students who have passed in STAT3907, or have already enrolled in this course.	Y	Y	2	May	---	Dr G Li, Statistics & Actuarial Science	Major in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Risk Management (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT4602	Multivariate data analysis	6	Pass in STAT3600 or STAT3907	Y	Y	2	May	50	Prof T W K Fung, Statistics & Actuarial Science	Major in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)	Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019); BSc in Actuarial Science (2017,2016,2015,2014, 2013); Major in Decision Analytics (2020,2019,2018,2017, 2016,2015,2014,2013); Minor in Statistics (2020,2019,2018,2017, 2016,2015,2014,2013)		
STAT4610	Bayesian learning	6		N	Y	---	---		, Statistics & Actuarial Science		Bachelor of Arts and Sciences in Applied Artificial Intelligence (2020,2019)		

SECTION IV Equivalency of HKDSE and other qualifications

Table of Equivalence between HKDSE and Other Qualifications

HKDSE	Grade	Equivalent Qualification to HKDSE				
		IB	**GCE**	**SATII**	**AP**	**Gao Kao (高考)**
Biology	3 or above	Biology (SL/HL)	Biology (AL)	Biology	Biology	Equivalent to fulfillment of all HKDSE requirements
Chemistry	3 or above	Chemistry (SL/HL)	Chemistry (AL)	Chemistry	Chemistry	
Physics	3 or above	Physics (SL/HL)	Physics (AL)	Physics	Physics B or C	
Mathematics	2 or above	Mathematics (SL)/Mathematical Studies (SL)	Mathematics (AL)	Mathematics Level 1 or 2		
Mathematics + (M1 or M2)	2 or above	Mathematics (HL)/Mathematical Studies (HL)	Pure Mathematics (AL) Further Mathematics (AL)		Calculus AB or BC	

Note:
HL: Higher Level
SL: Standard Level
AL: Advanced Level

Remarks:

For science students admitted through non-JUPAS scheme, the equivalent subject qualification(s) to HKDSE, if possessed, can be identified by the SIS for on-line course selection.

For other non-science students admitted through non-JUPAS scheme, they are still required to obtain the written approval from the Course Selection Adviser of the course offering department/school even they have possessed the equivalent HKDSE subject qualification(s) to meet the course prerequisite requirement. Once approval is given, they need to forward it to their home faculties to add the course on-line.

SECTION V BASc(AppliedAI) Programmes on offer in 2020/2021

Programme Title	Bachelor of Arts and Sciences in Applied Artificial Intelligence
Offered to students admitted to Year 1 in	**2020**

Objectives:

The aim of this curriculum that spans across Architecture, Engineering, Science and Social Sciences is to equip students with theoretical foundations of artificial intelligence, as well as the necessary problem-solving (both qualitative and quantitative) and analytical skills, and nurture them to transfer interdisciplinary scientific knowledge into a wide range of integrated applications and technological innovations, generating in the process valuable practical experiences. Students will learn to develop the intellectual capacity essential for meeting new challenges and resolving new problems in the future.

Learning Outcomes:

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

- PLO 1 : apprehend the concepts of artificial intelligence and its underlying theory in relation to a broad range of related disciplinary areas (by means of coursework and tutorial classes and/or research-based project in the curriculum)
- PLO 2 : be proficient with artificial intelligence techniques, and offer effective recommendations for innovative initiatives and solutions (by means of coursework and tutorial classes and/or research-based project in the curriculum)
- PLO 3 : acquire the necessary critical thinking, creative problem solving and communication skills for effective work and collaboration (by means of coursework and tutorial classes and/or research-based project in the curriculum)
- PLO 4 : communicate to people effectively and efficiently with professionalism and accuracy (by means of coursework and tutorial classes and/or research-based project in the curriculum)
- PLO 5 : gain insights into current advances and comprehensive knowledge of artificial intelligence to solve real-life problems (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combinations:

Major in Decision Analytics
This Major will not be offered to non-BASc(AppliedAI) students as a second major.

Required courses of the Major in Applied Artificial Intelligence (96 credits)

1. Introductory Level Disciplinary Core Courses (48 credits)

APAI1001	Artificial intelligence: foundation, philosophy and ethics (6)
COMP1117	Computer programming (6)
COMP2119	Introduction to data structures and algorithms (6)
COMP2120	Computer organization (6)
MATH1013	University mathematics II (6)
MATH2014	Multivariable calculus and linear algebra (6)
STAT2601	Probability and statistics I (6)
STAT2602	Probability and statistics II (6)

2. Advanced Level Disciplinary Core Courses (18 credits)

APAI3001	Deep learning (6)
MATH3904	Introduction to optimization (6)
STAT3612	Statistical machine learning (6)

3. Concentration (Disciplinary Electives) (24 credits)

At least 24 credits selected from the following courses:
(For fulfilling the requirement of a concentration, students should choose at least 18 credits, with at least 6 credits of which should be at advanced-level, from the corresponding list)

(a) Concentration: AI Technology (at least 18 credits)

COMP3271	Computer graphics (6)
COMP3356	Robotics (6)
APAI3010	Image processing and computer vision (6)
APAI4011	Natural language processing (6)
APAI4012	High-performance computing (6)
APAI4099	Special topics of applied AI (6)

(b) Concentration: AI in Business and Finance (at least 18 credits)

COMP3320	Electronic commerce technology (6)
MATH3901	Operations research I (6)
MATH3906	Financial calculus (6)
STAT3613	Marketing analytics (6)
STAT4601	Time-series analysis (6)
APAI4099	Special topics of applied AI (6)

(c) Concentration: AI in Medicine (at least 18 credits)

STAT3655	Survival analysis (6)
STAT4610	Bayesian learning (6)
APAI3021	Modern biostatistics (6)
APAI4022	Omics data analysis (6)
APAI4023	Medical image analysis (6)
APAI4099	Special topics of applied AI (6)

(d) Concentration: AI in Smart City (at least 18 credits)

URBS1003	Theories and Global Trends in Urban Development (6)
URBS1005	Urban Problems, Interventions and Design Thinking (6)
GEOG2090	Introduction to geographic information systems (6)
GEOG3202	GIS in environmental studies (6)
GEOG3420	Transport and society (6)
APAI4099	Special topics of applied AI (6)

(e) Concentration: AI in Neurocognitive Science (at least 18 credits)

PSYC1001	Introduction to psychology (6)
PSYC2051	Perception (6)
PSYC2066	Foundations of cognitive science (6)
APAI4099	Special topics of applied AI (6)

List of Other Elective Courses:

COMP3250	Design and analysis of algorithms (6)
COMP3278	Introduction to database management systems (6)
MATH3601	Numerical analysis (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
STAT3600	Linear statistical analysis (6)
STAT3622	Data visualization (6)
STAT4602	Multivariate data analysis (6)

4. Capstone Requirement (6 credits)

At least 6 credits selected from the following courses:
(If students take the 12-credit 'Applied AI project', they do not need to take a 6-credit elective from the 'List of Other Elective' Courses above. On the other hand, students who do not take the 12-credit 'Applied AI project' are allowed to take a course in one of the Concentrations as an elective.)

APAI3799	Directed studies in Applied AI (6)
APAI4766	Applied AI internship (6)
APAI4798	Applied AI project (12)

Notes:

1. Students are expected to be in full-time status for eight academic semesters (in additional to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BASc(Applied AI) programme, provided that they fully satisfy the requirements.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the programme in order to satisfy the degree graduation requirements.

Programme Title	Bachelor of Arts and Sciences in Applied Artificial Intelligence
Offered to students admitted to Year 1 in	**2019**

Objectives:

The aim of this curriculum that spans across Architecture, Engineering, Science and Social Sciences is to equip students with theoretical foundations of artificial intelligence, as well as the necessary problem-solving (both qualitative and quantitative) and analytical skills, and nurture them to transfer interdisciplinary scientific knowledge into a wide range of integrated applications and technological innovations, generating in the process valuable practical experiences. Students will learn to develop the intellectual capacity essential for meeting new challenges and resolving new problems in the future.

Learning Outcomes:

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PLO 1 : apprehend the concepts of artificial intelligence and its underlying theory in relation to a broad range of related disciplinary areas (by means of coursework and tutorial classes and/or research-based project in the curriculum)

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PLO 3 : acquire the necessary critical thinking, creative problem solving and communication skills for effective work and collaboration (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 4 : communicate to people effectively and efficiently with professionalism and accuracy (by means of coursework and tutorial classes and/or research-based project in the curriculum)

PLO 5 : gain insights into current advances and comprehensive knowledge of artificial intelligence to solve real-life problems (by means of coursework and tutorial classes and/or research-based project in the curriculum)

Impermissible Combinations:

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This Major will not be offered to non-BASc(AppliedAI) students as a second major.

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COMP2120	Computer organization (6)
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MATH2014	Multivariable calculus and linear algebra (6)
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STAT2602	Probability and statistics II (6)

2. Advanced Level Disciplinary Core Courses (18 credits)

APAI3001	Deep learning (6)
MATH3904	Introduction to optimization (6)
STAT3612	Statistical machine learning (6)

3. Concentration (Disciplinary Electives) (24 credits)

At least 24 credits selected from the following courses:
(For fulfilling the requirement of a concentration, students should choose at least 18 credits, with at least 6 credits of which should be at advanced-level, from the corresponding list)

(a) Concentration: AI Technology (at least 18 credits)

COMP3271	Computer graphics (6)
COMP3356	Robotics (6)
APAI3010	Image processing and computer vision (6)
APAI4011	Natural language processing (6)
APAI4012	High-performance computing (6)
APAI4099	Special topics of applied AI (6)

(b) Concentration: AI in Business and Finance (at least 18 credits)

COMP3320	Electronic commerce technology (6)
MATH3901	Operations research I (6)
MATH3906	Financial calculus (6)
STAT3613	Marketing analytics (6)
STAT4601	Time-series analysis (6)
APAI4099	Special topics of applied AI (6)

(c) Concentration: AI in Medicine (at least 18 credits)

STAT3655	Survival analysis (6)	*Take either STAT3655 or STAT3955 to fulfill the requirement; but not both. STAT3655 and STAT3955 are mutually exclusvie.*
STAT3955	Survival analysis (6)	*Take either STAT3655 and STAT3955 to fulfill the requirement; but not both. STAT3655 or STAT3955 are mutually exclusvie.*
STAT4610	Bayesian learning (6)	
APAI3021	Modern biostatistics (6)	
APAI4022	Omics data analysis (6)	
APAI4023	Medical image analysis (6)	
APAI4099	Special topics of applied AI (6)	

(d) Concentration: AI in Smart City (at least 18 credits)

URBS1003

	Theories and Global Trends in Urban Development (6)
URBS1005	Urban Problems, Interventions and Design Thinking (6)
GEOG2090	Introduction to geographic information systems (6)
GEOG3202	GIS in environmental studies (6)
GEOG3420	Transport and society (6)
APAI4099	Special topics of applied AI (6)

(e) Concentration: AI in Neurocognitive Science (at least 18 credits)

PSYC1001	Introduction to psychology (6)
PSYC2051	Perception (6)
PSYC2066	Foundations of cognitive science (6)
APAI4099	Special topics of applied AI (6)

List of Other Elective Courses:

COMP3250	Design and analysis of algorithms (6)
COMP3278	Introduction to database management systems (6)
MATH3601	Numerical analysis (6)
MATH3911	Game theory and strategy (6)
MATH3943	Network models in operations research (6)
STAT3600	Linear statistical analysis (6)
STAT3622	Data visualization (6)
STAT4602	Multivariate data analysis (6)

4. Capstone Requirement (6 credits)

At least 6 credits selected from the following courses:
(If students take the 12-credit 'Applied AI project', they do not need to take a 6-credit elective from the 'List of Other Elective' Courses above. On the other hand, students who do not take the 12-credit 'Applied AI project' are allowed to take a course in one of the Concentrations as an elective.)

APAI3799	Directed studies in Applied AI (6)
APAI4766	Applied AI internship (6)
APAI4798	Applied AI project (12)

Notes:

1. Students are expected to be in full-time status for eight academic semesters (in additional to their 6-month or longer full-time internships) in order to fulfill the degree requirements.

2. Students may optionally take Majors or Minors outside the BASc(Applied AI) programme, provided that they fully satisfy the requirements.

Remarks:

Important! Ultimate responsibility rests with students to ensure that the required pre-requisites and co-requisite of selected courses are fulfilled. Students must take and pass all required courses in the programme in order to satisfy the degree graduation requirements.

CAES1000	**Core University English (6 credits)**	**Academic Year**	2020
Offering Department	English	**Quota**	---
Course Co-ordinator	Dr P Wong, English *(pmtw2@hku.hk)*		
Teachers Involved	(Dr P Wong,Centre for Applied English Studies)		
Course Objectives			
Course Contents & Topics	The Core University English (CUE) course aims to enhance first-year students' academic English language proficiency in the university context. CUE focuses on developing students' academic English language skills for the Common Core Curriculum. These include the language skills needed to understand and produce spoken and written academic texts, express academic ideas and concepts clearly and in a well-structured manner and search for and use academic sources of information in their writing and speaking. Four online-learning modules through the Moodle platform on academic speaking, academic grammar, academic vocabulary, citation and referencing skills and avoiding plagiarism will be offered to students to support their English learning. This course will help students to participate more effectively in their first-year university studies in English, thereby enriching their first-year experience.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 identify and distinguish between main ideas and supporting details in lectures and written texts and demonstrate an understanding of the arguments / facts expressed CLO 2 form and express personal opinions through critical reading and listening CLO 3 argue for and defend a position in a clear and structured way using academic sources, through writing and speaking CLO 4 demonstrate control of grammatical accuracy and lexical appropriacy in academic communication		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	No Exam

Grade Descriptors (A+ to F)	
A	Excellent to outstanding result. Students are able to produce spoken and written academic texts which are at all times appropriately structured. Students can clearly and concisely explain academic concepts and critically argue for a detailed position. Students always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly at all times. Students demonstrate an ability to fully comprehend and critically interpret spoken and written texts. Written language contains very few, if any, systematic errors in grammar and vocabulary. Spoken language is always comprehensible and fluent.
B	Good to very good result. Students are able to produce spoken and written academic texts which are appropriately structured with only minor errors. Students can almost always clearly and concisely explain academic concepts and almost always critically argue for a detailed position. Students almost always use appropriate academic sources to support their ideas in writing and speaking. They cite and reference correctly with only a few non-systematic errors. Students can comprehend and interpret texts with ease, although they may miss some implied meanings and opinions. Written language is mostly accurate but contains a few systematic errors in complex grammar and vocabulary. Spoken language is mostly comprehensible and fluent.
C	Satisfactory to reasonably good result. Spoken and written academic texts produced by students are sometimes not-well structured but there is some evidence of this ability. Students are sometimes unable to clearly and concisely explain academic concepts. While they can argue for a position, it is not very detailed and tend to be simplistic rather than critical. Students sometimes use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are some systematic errors in citation and referencing but also evidence of correct systematic use. Students have some difficulty comprehending and critically interpreting texts. They can always understand the main ideas but may miss some of the writer's views and attitudes. Written language is sometimes inaccurate, although errors, when they occur, are more often in complex grammar and vocabulary and there is some evidence of control of simple grammatical structures. Spoken language is generally comprehensible and fluent but at times places strain on the listener.
D	Barely satisfactory result. Spoken and written academic texts produced by students are often inappropriately structured but there may be some evidence of this ability. Students are often unable to clearly and concisely explain academic concepts and argue for a position. There is some evidence of an ability to explain academic concepts but not to critically argue for a position. Students often use sources which are nonacademic and/or not appropriate to support their ideas in writing and speaking. There are many systematic errors in citation and referencing however there is evidence of an understanding of some of the conventions of citation and referencing. Students often have difficulty comprehending and interpreting texts, sometimes failing to understand the main ideas and writer's views and attitudes. Written language is often inaccurate containing errors in a range of simple and complex grammar and vocabulary. Spoken language is only sometimes comprehensible and fluent, and strain is frequently placed on the listener.
Fail	Unsatisfactory result. Productive skills are too limited to be able to successfully carry out spoken and written assessments. Texts are unstructured and unclear. Students are unable to follow and interpret texts. There are language errors in almost every sentence. Spoken language is often incomprehensible. Assessments may not have been attempted or contain plagiarism.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		30
	Tutorials		6
	Reading / Self study		84

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	coursework	100	

CAES9821	**Professional and technical communication for mathematical sciences (6 credits)**	**Academic Year**	2020
Offering Department	English	**Quota**	---
Course Co-ordinator	Mr S D Boynton, English *(sboynton@hku.hk)*		
Teachers Involved	(Mr S D Boynton,Centre for Applied English Studies)		
Course Objectives	This 6-credit English-in-the-Discipline course aims to develop students' professional and technical communication skills for disciplinary studies in mathematical sciences.		
Course Contents & Topics	There are two main components in the course: 1. Case study report writing 2. Professional oral presentation Students will learn rhetorical skills for presenting and explaining mathematical and statistical data and trends, and justifying analyses and recommendations convincingly in both written and spoken communication. This will be achieved through analysing samples of case study reports and presentations using a genre-based approach.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 present and explain mathematical and statistical data and trends using appropriate rhetorical skills		
	CLO 2 organize and articulate coherent ideas with appropriate language devices in a case study report and an oral presentation		
	CLO 3 justify analyses and recommendations convincingly in a case study report and an oral presentation		
	CLO 4 identify their own language learning needs, develop independent learning strategies to address those needs, and reflect on their own independent language learning experience		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	No Exam

Grade Descriptors (A+ to F)

A	Wholly appropriate productive skills displaying a complete awareness of audience, purpose and structure across all disciplinary work. Students are able to critically analyse a case scenario, convincingly justify analyses and recommendations, and discuss data limitations when relevant. Students are able to successfully evaluate their language performance in all areas and propose specific and relevant future language learning plans. Spoken language is fully comprehensible and fluent. Written language contains a sophisticated range of grammar and vocabulary, with very few systematic errors.
B	Mostly appropriate productive skills displaying good awareness of audience, purpose and structure, although there are occasional lapses in areas. Students are able to analyse a case scenario, justify analyses and recommendations, and discuss data limitations when relevant. Students are able to evaluate their language performance in most areas and propose relevant future language learning plans. Spoken language is comprehensible and fluent. Written language contains a good range of grammar and vocabulary, making some systematic errors of language which generally do not impede understanding.
C	Productive skills are generally appropriate for the intended audience. There is an overall sense that the work is communicating successfully. Purposes are generally clear and tone is generally suitable. Students are generally able to analyse a case scenario and make recommendations, but the analysis and recommendations need more justification. Students are able to evaluate their language performance in a limited number of areas and proposed future language learning plans are rather vague. Spoken language is generally comprehensible and fluent. Written language contains inaccuracies when complex grammar and vocabulary are used.
D	Productive skills display weaknesses in awareness of purpose and audience. Tone is at times unsuitable. Students superficially analyse a case scenario, and the analyses and recommendations are vague. The structure is generally appropriate although links between sections may be lacking. Students are able to evaluate their language performance only in few areas and the proposed future language learning plans may not be relevant. Written language contains frequent errors in complex grammar and vocabulary, but the written work can still be followed by a patient and sympathetic audience. Spoken language is comprehensible and quite fluent, but stain is at times placed on the listener.
Fail	Productive skills show little or no awareness of audience or are too limited to be able to successfully carry out tasks. Students are unable to analyse a case scenario and make reasonable recommendations. Ideas are incoherent, vague and unstructured. Students are not able to evaluate their language performance and propose future language learning plans. There are frequent language errors in both simple and complex grammar in written work, which impede successful comprehension of ideas and points. Spoken language places considerable strain on the listener throughout. Assessments may not have been attempted or contain plagiarism.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures	seminars	30
	Tutorials	small group tutorials	6
	Reading / Self study		120
	Assessment	independent learning work	84

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		40	
	Presentation		30	
	Project reports		30	

Additional Course Information	Students of the BSc (Actuarial Science) and BASc(Applied AI) are required to take this course. Students who intend to major in decision analytics, mathematics, risk management, and statistics are strongly encouraged to take this course. Students from other science disciplines should take CAES9820.

CSCI9001	**Practical Chinese for science students (6 credits)**	**Academic Year**	2020
Offering Department	Chinese	**Quota**	---
Course Co-ordinator	Mr K W Wong, Chinese *(kwwongb@hku.hk)*		
Teachers Involved	(Dr C M Chan,Chinese) (Dr K T Lam,Chinese) (Dr S F Lee,Chinese) (Mr K W Wong,Chinese)		
Course Objectives	This course aims to enhance the students' competence using Chinese for professional communication. It helps the students to master the techniques of writing different types of documents such as memos, emails, letters, announcements, notice, brochures, leaflets, and reports. In addition, topics addressing resentation and discussion techniques, the style and rhetoric of reader-based writings are included to heighten the students' linguistic sensitivity.		
Course Contents & Topics	- Grammar & vocabulary of modern Chinese - The Chinese writing system - Techniques of writing short messages: good-news and goodwill messages, bad-news messages, and persuasive messages - Techniques of writing electronic documents: emails; presentations - Styles and rhetoric of reader-based reports, proposals and presentations		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 develop a balanced competency in modern Chinese and write well-formed sentences		
	CLO 2 employ rhetorical devices and stylistics, as well as practical writing skills specific to their discipline		
	CLO 3 explore new tactics of communication, initiate discussions and debates and address new challenges		
	CLO 4 apply their disciplinary knowledge and their Chinese writing skills and professional presentation techniques analytically, critically and creatively in different social or professional discourses		
Pre-requisites (and Co-requisites and Impermissible combinations)	NIL		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May

Grade Descriptors (A+ to F)

A	The student acquired a superb ability to achieve the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize the language techniques for effective communication in all situations.
B	The student acquired the ability to achieve the intended learning outcomes of the course at all levels of learning: describe, apply, evaluate, and synthesize the language techniques for effective communication in most situations.
C	The student acquired adequate ability to achieve the intended learning outcomes of the course at low levels of learning (i.e. describe and apply the language techniques for effective communication) but not at high levels of learning (i.e. evaluate and synthesize the language techniques for effective communication).
D	The student only has basic familiarity with the subject.
Fail	The student has very limited familiarity with the subject.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		12
	Tutorials	Small group tutorials	12
	Group work	Workshops	24
	Discussion		24
	Reading / Self study	Reading/self study (20 hours) and preparation (12 hours)	32
	Assessment		16

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Self-access & online exercises (40%) and Tutorial disscussion (10%)	50	
	Examination		50	

Required/recommended reading and online materials	汪麗炎，1998年。《漢語修辭》。上海：上海大學出版社。李家樹、謝耀基，1994年。《漢語的特性和運用》。香港：香港大學出版社。香港城市大學語文學部，2001年。《中文傳意：基礎篇》。香港：香港城市大學出版社。周錫韋復，1996年。《中文應用寫作教程》。香港：三聯書店。李錦昌，2000年。《現代商業傳意大全》。香港：商務印書館。汪麗炎，1998年。《漢語寫作》。上海：上海大學出版社。香港城市大學語文學部，2001年。《中文傳意：寫作篇》。香港：香港城市大學出版社。經文略、蘭德主編，2001年。《企業文案撰寫模式大全》。廣州：廣東經濟出版社。劉美森，2001年。《新編公文寫作學》。成都：四川人民出版社。黎運漢、李軍，2001年。《商業語言》。台北：台灣商務印書館。

MATH1013	**University mathematics II (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	500
Course Co-ordinator	Dr C W Wong, Mathematics *(cwwongab@hku.hk)*		
Teachers Involved	(Dr C W Wong,Mathematics)		
Course Objectives	This course aims at students with Core Mathematics plus Module 1 or Core Mathematics plus Module 2 background and provides them with basic knowledge of calculus and some linear algebra that can be applied in various disciplines. It is expected to be followed by courses such as MATH2012, MATH2101, MATH2102, MATH2211, and MATH2241.		
Course Contents & Topics	- Functions; graphs; inverse functions. - Limits; continuity and differentiability. - Mean value theorem; Taylor's theorem; implicit differentiation; L'Hopital's rule. - Higher order derivatives; maxima and minima; graph sketching. - Radian, calculus of trigonometric functions. - Definite and indefinite integrals; integration by substitutions; integration by parts; integration by partial fractions. - Complex numbers, polar form, de Moivre's formula. - Applications: Solving simple ordinary differential equations. - Basic matrix and vector (of orders 2 and 3) operations, determinants of 2x2 or 3x3 matrices.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 describe properties of functions and inverse functions		
	CLO 2 evaluate limits, and determine continuity and differentiability of functions		
	CLO 3 apply advanced rules/techniques of differentiation and integration to compute derivatives and integrals; sketch graphs of functions; approximation of functions		
	CLO 4 solve problems involving complex numbers		
	CLO 5 solve simple first and second order ordinary differential equations		
Pre-requisites (and Co-requisites and Impermissible combinations)	Level 2 or above in Module 1, or Module 2 of HKDSE Mathematics or equivalent, or Pass in MATH1009 or MATH1011; and Not for students who have passed MATH1821, or (MATH1851 and MATH1853), or have already enrolled in this course.		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May

Grade Descriptors (A+ to F)	
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments		10	CLO 1,2,3,4,5
	Examination		50	CLO 1,2,3,4,5
	Test		40	CLO 1,2,3,4,5

Required/recommended reading and online materials	Adrian Banner: The Calculus Lifesaver: All the Tools You Need to Excel at Calculus (Princeton University Press, 2007) George B. Thomas, Maurice D. Weir and Joel Hass: Thomas' Calculus (12th edition, Addison Wesley)
Course Website	http://moodle.hku.hk/
Additional Course Information	Students who have passed MATH1013 are not allowed to take MATH1009. Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S1.pdf http://hkumath.hku.hk/~math/Timetable/timetable2021_S2.pdf

MATH2014	**Multivariable calculus and linear algebra (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr H Y Zhang, Mathematics *(hyzhang@maths.hku.hk)*		
Teachers Involved	(Dr H Y Zhang,Mathematics)		
Course Objectives	To provide students with a solid foundation in calculus of several variables and linear algebra, which they will need in the study of mathematics related subjects.		
Course Contents & Topics	- Vectors and Matrices: Vectors in space, dot product and cross product, determinants (with geometric interpretations). - Partial Derivatives: Functions of several variables, partial derivatives, extreme values and Lagrange multipliers, Taylor's formula. - Multiple Integrals: Double and triple integrals, substitution in multiple integrals. - Matrix Algebra: Matrix addition and multiplication, system of linear equations as a matrix equation. - Vector Spaces: The Euclidean spaces as vector spaces, its subspaces, span of vectors, linear independence, basis and dimension. - Eigenvalues and Eigenvectors: Diagonalization and computing powers. - Numerical Methods: Bisection method and Newton's method for finding roots of equations, Simpson's rule and Trapezoidal rule for numerical integration.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	understand the geometric meaning of partial and directional derivatives	
	CLO 2	optimize multivariate objective functions (with/without constraints)	
	CLO 3	evaluate integrals over curvilinear regions in space	
	CLO 4	understand the concept of vector spaces, basis, dimension	
	CLO 5	solve simple eigenvalue problems and apply the theory to practical problems	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH1013 or (MATH1851 and MATH1853). Not for students who have passed MATH2822 or [(MATH2101 or MATH2102) and MATH2211], or have already enrolled in these courses.		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May
Grade Descriptors (A+ to F)	**A**	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analyzing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.	
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analyzing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.	
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analyzing problems with poor argument and presentation or a number of minor computational errors.	
	D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analyzing problems with poor argument or presentation or with substantial computational errors.	
	Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3,4,5
Test		50	CLO 1,2,3,4,5

Required/recommended reading and online materials	TBC
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S1.pdf http://hkumath.hku.hk/~math/Timetable/timetable2021_S2.pdf

MATH3601	**Numerical analysis (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Zhang, Mathematics *(zhangzw@maths.hku.hk)*		
Teachers Involved	(Dr Z Zhang,Mathematics)		
Course Objectives	This course covers both the theoretical and practical aspects of numerical analysis. Emphasis will be on basic principles and numerical methods of solution, using high speed computers.		
Course Contents & Topics	- Different types of errors, condition number, and convergence order. - Polynomial interpolation and function approximation. - Solution of equations of one variable. - Direct and iterative methods for solving linear systems. - Numerical differentiation and integration. - Simple initial value problems for Ordinary Differential Equations.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	construct and implement algorithms to find the zeros of functions, apply the bisection, Newton, Secant and fixed point iteration methods; and construct and implement Newton's method to solve a system of nonlinear equations
CLO 2	apply direct and iterative methods for solving linear equation systems
CLO 3	construct interpolation polynomials in Lagrange, Newton, Hermite and spline forms
CLO 4	understand the basic numerical integration and differentiation methods
CLO 5	apply Euler methods and Runge-Kutta methods to solve initial value problems
CLO 6	use software package such as Scilab or Matlab or Python to solve numerical problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822)		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	Dec

Grade Descriptors (A+ to F)

A	Demonstrate an excellent understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out numerical procedures carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and methods by being able to identify the appropriate theorems/algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate algorithms or their applications or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with some inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with a number of minor computational errors.
D	Demonstrate some understanding of key concepts and methods by being able to correctly identify appropriate theorems/algorithms, but with substantial inadequacies in applying the theorems/methods through incorrectly analysing problems with poor argument and presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems/algorithms or their applications, or not being able to complete the solution.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3,4,5,6
Test		50	CLO 1,2,3,4,5,6

Required/recommended reading and online materials	Instructor's Lecture Notes A. Ralston and P. Rabinowitz: A First Course in Numerical Analysis (McGraw-Hill) K. E. Atkinson: An Introduction to Numerical Analysis (Wiley, 1989)
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S1.pdf

MATH3901	**Operations research I (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr Z Qu, Mathematics *(zhengqu@maths.hku.hk)*		
Teachers Involved	(Dr Z Qu,Mathematics)		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of Linear Programming (LP) and its related topics in operations research. The topics include the simplex method, the dual simplex method, parametric programming, decomposition method, cutting plane methods and branch and bound. There is an equal emphasis on all the three aspects of theories, algorithms and applications. The course serves, together with the course MATH3943 Network Models in Operations Research, as essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	- Linear programming - Duality theory - Sensitivity analysis and parametric linear programming - Ellipsoid methods - Interior point methods		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 understand the fundamental concept and approach of linear programming appropriate to the further study of operations research		
	CLO 2 demonstrate knowledge and understanding of the underlying techniques of the simplex method and its extensions such as the dual simplex algorithm and the decomposition method		
	CLO 3 understand and apply the theory of integer programming		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in MATH2014 or MATH2101 or MATH2102		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	Dec

Grade Descriptors (A+ to F)

A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework assessment	10	CLO 1,2,3
	Examination		50	CLO 1,2,3
	Test	Two midterm tests	40	CLO 1,2,3

Required/recommended reading and online materials	J.P. Ignizio and T.M. Cavalier: Linear Programming (Prentice-Hall International, 1994) D. Bertsimas and J.N. Tsitsiklis: Introduction to Linear Optimization (Athena Scientific, 1997) W.L. Winston: Introduction to Mathematical Programming (Duxbury 4/e 2003)
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S1.pdf

MATH3904	**Introduction to optimization (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	(Prof W Zang,Mathematics)		
Course Objectives	This course introduces students to the theory and techniques of optimization, aiming at preparing them for further studies in operations research, mathematical economics and related subject areas.		
Course Contents & Topics	- Unconstrained and constrained optimization. - Necessary conditions and sufficient conditions for optimality, convexity, duality. - Algorithms and numerical examples.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 demonstrate knowledge and understanding of the basic theory and techniques of optimization		
	CLO 2 solve various optimization problems encountered in practice		
	CLO 3 understand the connection between the purely analytical character of an optimization problem and the behavior of algorithms for solving it		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822)		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	Dec

Grade Descriptors (A+ to F)	
A	Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting				
	Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Examination		50	CLO 1,2,3
	Test		50	CLO 1,2,3

Required/recommended reading and online materials	Instructor's lecture notes
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S1.pdf

MATH3906	**Financial calculus (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr G Li, Mathematics *(lotusli@maths.hku.hk)*		
Teachers Involved	(Dr G Li,Mathematics)		
Course Objectives	This course gives an elementary treatment for the modeling of financial derivatives, asset pricing and market risks from an applied mathematician's point of view. Stochastic calculus and solution methods will be introduced.		
Course Contents & Topics	- An introduction to financial instruments: stocks, bonds, options, forward and future contracts. - Asset pricing: risk neutral relationship, no arbitrage principle. Brownian motion, stochastic calculus, Ito's Lemma, Black-Scholes model and its pricing partial differential equation. - Variations on the Black-Scholes model, American options, path dependent options. Binomial tree Models. Discrete Martingale.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 understand the terminology and nature of bonds, interest rates, forwards, futures, stocks, options, and the no-arbitrage-principle		
	CLO 2 demonstrate knowledge on using binomial tree models to find option prices via the risk-neutral concept		
	CLO 3 describe basic properties of a Brownian motion and the Black-Scholes stock price model		
	CLO 4 implement stochastic calculus (such as Ito's Lemma) to derive Black-Scholes pricing partial differential equation on various type of options; and find a solution to this partial differential equation		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 and MATH2211) or MATH2014 or (MATH1821 and MATH2822) or STAT2601		
Offer in 2020 - 2021	Y 2nd sem Offer in 2021 - 2022 : Y	**Examination**	May
Grade Descriptors (A+ to F)	**A** Demonstrate an excellent understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.		
	B Demonstrate a good understanding of key concepts and ideas by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.		
	C Demonstrate an acceptable understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.		
	D Demonstrate some understanding of key concepts and ideas by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.		
	Fail Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.		
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	Details	No. of Hours
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	Details	Weighting in final course grade (%)	Assessment Methods to CLO Mapping
Examination		50	CLO 1,2,3,4
Test		50	CLO 1,2,3,4

Required/recommended reading and online materials	A. Etheridge: A Course in Financial Calculus (Cambridge University Press) M. Baxter and A. Rennie: Financial Calculus: An Introduction to Derivative Pricing (Cambridge University Press, 1996) P. Wilmott, S. Howison, J. Dewynne: The Mathematics of Financial Derivatives (Cambridge University Press, 1995) R. Jarrow and S. Turnbull: Derivative Securities (South-Western College Publishing, 1994)
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S2.pdf

MATH3911	**Game theory and strategy (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Dr K H Law, Mathematics *(lawkaho@connect.hku.hk)*		
Teachers Involved	(Dr K H Law,Mathematics)		
Course Objectives	Game theory is the logical analysis of situations of conflict and cooperation. This course will introduce the students to the basic ideas and techniques of mathematical game theory in an interdisciplinary context.		
Course Contents & Topics	- Combinatorial games and Zermelo's Theorem; Prisonner's Dilemma; pure and mixed strategies, minimax theorem; mixed Nash equilibria. - Application to biology: evolutionary stable strategies; games in coalition form; Shapley value. - Application to politics: Shapley-Shubik power index; core and von Neumann-Morgenstern solution; bargaining set.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1 understand the basic terminology and solution concepts in game theory		
	CLO 2 compute explicitly different solution concepts for some simple cooperative and non-cooperative games		
	CLO 3 apply game theoretical ideas and methods to solve some problems in economics and biology		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 and MATH2211) or (MATH1821 and MATH2822)		
Offer in 2020 - 2021	Y 2nd sem Offer in 2021 - 2022 : Y	**Examination**	May

Grade Descriptors (A+ to F)

A	Demonstrate an excellent understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and being able to carry out computations carefully and correctly, and with some innovative approaches to solving problems.
B	Demonstrate a good understanding of key concepts and ideas of Game Theory by being able to identify the appropriate theorems and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.
C	Demonstrate an acceptable understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.
D	Demonstrate some understanding of key concepts and ideas of Game Theory by being able to correctly identify appropriate theorems, but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.
Fail	Demonstrate poor and inadequate understanding by not being able to identify appropriate theorems or their applications, or not being able to complete the solution.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	assignments, tutorials, participation etc	5	CLO 1,2,3
	Examination		50	CLO 1,2,3
	Project reports		20	CLO 1,2,3
	Test		25	CLO 1,2,3

Required/recommended reading and online materials	[Textbook] L.C. Thomas: Games, Theory and Applications (Dover Publications, 2003) [Reference] Alan D. Taylor and Allison M. Pacelli, Mathematics and Politics: Strategy, Voting, Power, and Proof (Springer-Verlag, 2009)
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S2.pdf

MATH3943	**Network models in operations research (6 credits)**	**Academic Year**	2020
Offering Department	Mathematics	**Quota**	---
Course Co-ordinator	Prof W Zang, Mathematics *(wzang@maths.hku.hk)*		
Teachers Involved	(Prof W Zang,Mathematics)		
Course Objectives	The objective is to provide a fundamental account of the basic results and techniques of network models in operations research. There is an equal emphasis on all three aspects of understanding, algorithms and applications. The course serves, together with a course on linear programming, to provide essential concept and background for more advanced studies in operations research.		
Course Contents & Topics	- Graphs and algorithms. - Trees, matchings and paths. - Network models of transportation and assignment problems. - Ford-Fulkerson network flow theory and computation for maximum flow and minimum cost flow algorithms. - Applications to combinatorial optimization problems such as allocation, location and sequencing. - Project networks, if time permits.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	understand the fundamental concept and approach of graphs and network models appropriate to the further study of operations research	
	CLO 2	demonstrate knowledge and understanding of the underlying techniques of the various graph and network algorithms and their extensions	
	CLO 3	understand the theory of network flows and the duality aspects in such methods of flow computations	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in (MATH2101 and MATH2211) or MATH2014; and Pass in MATH3901, or already enrolled in this course.		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---
Grade Descriptors (A+ to F)	**A**	Demonstrate an excellent understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, clearly and elegantly presenting correct logical reasoning and argumentation and being able to carry out computations carefully and correctly, and to solve problems with some innovative approaches.	
	B	Demonstrate a good understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications through correctly analysing problems, but with some minor inadequacies in arguments, identifying the appropriate theorems or their applications and presentation or with some minor computational errors.	
	C	Demonstrate an acceptable understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with some inadequacies in applying the theorems through incorrectly analysing problems with poor argument and presentation or a number of minor computational errors.	
	D	Demonstrate some understanding of key concepts and ideas by being able to identify basic principles, appropriate theorems, algorithms and their applications but with substantial inadequacies in applying the theorems through incorrectly analysing problems with poor argument or presentation or with substantial computational errors.	
	Fail	Demonstrate poor and inadequate understanding by not being able to identify basic principles, appropriate theorems, algorithms or their applications, or not being able to complete or compute the solution.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Examination		50	CLO 1,2,3
Test		50	CLO 1,2,3

Required/recommended reading and online materials	M.S. Bazaraa, J.J. Jarvis and H.D. Sheral: Linear Programming and Network Flows. (2/e 1990) R.K. Ahuja, T.L. Magnanti and J.L. Orlin: Network Flows: Theory Algorithms, and Applications. (1993) H.A. Taha: Operations Research: an Introduction. (7/e 2003)
Course Website	http://moodle.hku.hk/
Additional Course Information	Timetable: http://hkumath.hku.hk/~math/Timetable/timetable2021_S2.pdf

APAI1001	**Artificial intelligence: foundation, philosophy and ethics (6 credits)**	**Academic Year**	2019
Offering Department	Statistics & Actuarial Science	**Quota**	20
Course Co-ordinator	Prof J J F Yao, Statistics & Actuarial Science *(jeffyao@hku.hk)*		
Teachers Involved	(Dr J Y F Lau,Philosophy) (Prof J J F Yao,Statistics & Actuarial Science) (Prof M K P Ng,Mathematics)		
Course Objectives	The goal of this course is to expose students to the fundamental concepts of artificial intelligence (AI), including the history of AI, the classical and modern approaches, the main techniques used in AI, the challenges and major breakthroughs, the philosophical problems and ethical issues, and the application fields. This course is exclusive to BASc(AppliedAI) students.		
Course Contents & Topics	The course will introduce a number of key ideas, concepts and methods relevant to AI. It has two sections, a technical one and a philosophical one. The technical section will cover the following topics: (1) Solving problems by searching; classical and adversarial search methods. (2) Knowledge, reasoning and planning: first-order logic and inference; knowledge representation; classical, hierarchical and multiagent planning; (3) Uncertain knowledge and reasoning: quantifying uncertainty, probabilistic reasoning; making decision under uncertainty. (4) Learning: learning from examples, knowledge in learning, learning probabilistic models. The section on philosophy will address three topics: (1) Philosophical challenges to AI, concerning questions such as whether AI can achieve genuine understanding, with thoughts, conscious feelings, and emotions. (2) Ethical and political issues related to the use of AI, such as privacy, legitimacy of human enhancement, and how AI might affect socio-economic inequality. (3) The idea of singularity and the implications of AI for the future of humanity, and whether AI poses an existential threat.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	Apprehend the concepts of artificial intelligence and its underlying theory in relation to a broad range of related disciplinary areas.	
	CLO 2	Be proficient with artificial intelligence techniques, and offer effective recommendations for innovative initiatives and solutions.	
	CLO 3	Acquire the necessary critical thinking, creative problem solving and communication skills for effective work and collaboration.	
	CLO 4	Gain insights into current advances and comprehensive knowledge of artificial intelligence to solve real-life problems.	
	CLO 5	Communicate to people effectively and efficiently with professionalism and accuracy.	
Pre-requisites (and Co-requisites and Impermissible combinations)	For BASc(AppliedAI) students only.		
Offer in 2019 - 2020	Y 1st sem Offer in 2020 - 2021 : Y	**Examination**	Dec
Grade Descriptors (A+ to F)	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	50	CLO 1,2,3,4,5
Examination		50	CLO 1,3,4

Required/recommended reading and online materials	1. Stuart J. Russell and Peter Norvig (2010). Artificial Intelligence A Modern Approach (3rd edition). Pearson Education, Inc. 2. Entry on AI in the [Stanford Encyclopedia of Philosophy](https://plato.stanford.edu/index.html) [Artificial Intelligence (Stanford Encyclopedia of Philosophy)](https://plato.stanford.edu/entries/artificial-intelligence/) 3. Jose Luis Bermudez (2014). Cognitive Science: An Introduction to the Science of the Mind (2nd edition). Cambridge university Press.
Course Website	http://moodle.hku.hk
Additional Course Information	New course created for BASc AppliedAI Jointly offered by Department of Statistics and Actuarial Science, Department of Mathematics and Department of Philosophy

APAI1001	**Artificial intelligence: foundation, philosophy and ethics (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	20
Course Co-ordinator	Prof J J F Yao, Statistics & Actuarial Science *(jeffyao@hku.hk)*		
Teachers Involved	(Dr J Y F Lau,Philosophy) (Prof J J F Yao,Statistics & Actuarial Science) (Prof M K P Ng,Mathematics)		
Course Objectives	The goal of this course is to expose students to the fundamental concepts of artificial intelligence (AI), including the history of AI, the classical and modern approaches, the main techniques used in AI, the challenges and major breakthroughs, the philosophical problems and ethical issues, and the application fields. This course is exclusive to BASc(AppliedAI) students.		
Course Contents & Topics	The course will introduce a number of key ideas, concepts and methods relevant to AI. It has two sections, a technical one and a philosophical one. The technical section will cover the following topics: (1) Solving problems by searching; classical and adversarial search methods. (2) Knowledge, reasoning and planning: first-order logic and inference; knowledge representation; classical, hierarchical and multiagent planning; (3) Uncertain knowledge and reasoning: quantifying uncertainty, probabilistic reasoning; making decision under uncertainty. (4) Learning: learning from examples, knowledge in learning, learning probabilistic models. The section on philosophy will address three topics: (1) Philosophical challenges to AI, concerning questions such as whether AI can achieve genuine understanding, with thoughts, conscious feelings, and emotions. (2) Ethical and political issues related to the use of AI, such as privacy, legitimacy of human enhancement, and how AI might affect socio-economic inequality. (3) The idea of singularity and the implications of AI for the future of humanity, and whether AI poses an existential threat.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	Apprehend the concepts of artificial intelligence and its underlying theory in relation to a broad range of related disciplinary areas.	
	CLO 2	Be proficient with artificial intelligence techniques, and offer effective recommendations for innovative initiatives and solutions.	
	CLO 3	Acquire the necessary critical thinking, creative problem solving and communication skills for effective work and collaboration.	
	CLO 4	Gain insights into current advances and comprehensive knowledge of artificial intelligence to solve real-life problems.	
	CLO 5	Communicate to people effectively and efficiently with professionalism and accuracy.	
Pre-requisites (and Co-requisites and Impermissible combinations)	For BASc(AppliedAI) students only.		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	Dec
Grade Descriptors (A+ to F)	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	50	CLO 1,2,3,4,5
Examination		50	CLO 1,3,4

Required/recommended reading and online materials	1. Stuart J. Russell and Peter Norvig (2010). Artificial Intelligence A Modern Approach (3rd edition). Pearson Education, Inc. 2. Entry on AI in the [Stanford Encyclopedia of Philosophy](https://plato.stanford.edu/index.html) [Artificial Intelligence (Stanford Encyclopedia of Philosophy)](https://plato.stanford.edu/entries/artificial-intelligence/) 3. Jose Luis Bermudez (2014). Cognitive Science: An Introduction to the Science of the Mind (2nd edition). Cambridge university Press.
Course Website	http://moodle.hku.hk
Additional Course Information	New course created for BASc AppliedAI Jointly offered by Department of Statistics and Actuarial Science, Department of Mathematics and Department of Philosophy

APAI3001	**Deep learning (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	The goal of this course is to introduce the mathematical, statistical and computational challenges in deep learning. It covers major deep learning algorithms under different settings, and their applications to solve real world problems.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	50	
Examination		50	

APAI3010	**Image processing and computer vision (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course is a first-level introductory course to image processing. It covers a selected range of topics from elementary ones such as visual perception, image acquisition, to more advanced one such as object extraction, image segmentation, image restoration and texture modeling.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	25	
Examination		75	

APAI3021	**Modern biostatistics (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course is designed to introduce students the basic concepts and problems in the biology, medical, public health fields. Upon completion of the course, students would have background about epidemiology, population genetics, which are the foundations of the courses in the AI in medicine concentration.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	25	
Examination		75	

APAI3799	**Directed studies in Applied AI (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	The student undertakes a self-managed study on an applied topic in artificial intelligence under the supervision of a staff member. The topic is preferably one not sufficiently covered in the regular curriculum. The directed study can be a critical review or a synthesis of published work on the subject, or a laboratory or field study that would enhance students' understanding of the subject. The project may not require an element of originality.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.]
B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type: Project-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Reading / Self study	discussion & meetings to be arranged by the student & the supervisor	120

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Oral presentation	oral presentation & in-class discussion	40	
Research report	written report	60	

APAI4011	**Natural language processing (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course covers a broad range of topics in natural language processing (NLP), including word and sentence tokenization, text classification and sentiment analysis, spelling correction, information extraction, parsing, meaning extraction and question answering, etc. The underlying theory from probability, statistics, and machine learning will be introduced.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	25	
Examination		75	

APAI4012	**High-performance computing (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course aims to teach students the practical programming skills in Artificial Intelligence (AI), Machine Learning (ML), and Deep Leaning (DL). First, students will learn basic concepts and algorithms for AI, ML, and DL, which are highly interdisciplinary field with applications in sciences and engineering, such as self-driving cars, healthcare, and computer vision. Some mathematical and computational issues will be covered.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : N	**Examination**	---

Grade Descriptors (A+ to F)		
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12

Assessment Methods and Weighting				
	Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials, and class test(s))	50	
	Examination		50	

APAI4022	**Omics data analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course introduces Omics data acquisition techniques and emphasizes advanced statistical tools to analyze the high-throughput Omics data.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	25	
Examination		75	

APAI4023	**Medical image analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	The objective of this course is to provide students with an overview of the machine learning methods in medical image processing and analytics. We will study many of the current methods used to enhance and extract useful information from medical images. A variety of radiological diagnostic scenarios will be used as examples to motivate the methods.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : N	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	25	
Examination		75	

APAI4099	**Special topics of applied AI (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	Selective topics of applied AI in varying disciplines. Student seminars based on reading the predefined list of research papers. Guest lectures to be delivered by invited speakers (esp. industrial experts) to discuss the cutting-edge AI technologies in business and finance, medicine, smart city, neurocognitive science and other areas.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : N	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, class test(s) and project (s))	100	

APAI4766	**Applied AI internship (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	This course is offered to BASc(AppliedAI) students who take on a minimum of 160 hours of project-driven internship work related to his/her major disciplines. It provides students with first-hand experience in the applications of academic knowledge in a real-life work environment.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (Pass /Pass with distinction /Fail)

Distinction	Demonstrates excellent ability in applying knowledge to solve problems in the workplace. Demonstrates excellent performance in handling and carrying out the work required in the job or assigned by supervisor(s). Establishes highly effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, with excellent performance in written and oral report, and excellent evaluation by supervisor(s), etc.
Pass	Able to apply knowledge to solve problems in the workplace. Successfully handles and carries out the work required in the job or assigned by supervisor(s). Establishes effective collaboration and communication with supervisor(s), colleagues, and clients in the job. Successfully fulfills the requirements set out in the Course Description regarding working hours, written and oral report, and evaluation by supervisor(s), etc. Students demonstrating excellent performance in the above would be awarded a grade of "Distinction".
Fail	Very limited or no ability to solve problems in the workplace. Fails to handle or carry out the work required in the job or assigned by supervisor(s). Fails to establish effective collaboration or communication with supervisor(s), other colleagues, or clients in the job. Fails to satisfy the requirements set out in the Course Description regarding working hours, written and oral report, or evaluation by supervisor(s), etc.

Course Type: Internship

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Internship work	it is expected that students are to work at least 160 hours (or equivalent to 4 weeks full-time)	160

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Oral presentation	oral presentation and in-class discussion	40	
Written report	written report	60	

APAI4798	**Applied AI project (12 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	TBC, --- *()*		
Teachers Involved			
Course Objectives	Each year a few projects suitable for BASc(AppliedAI) students will be offered to provide students with practical experience in approaching a real problem, in report writing and in oral presentation. These projects, under the supervision of individual staff members, involve the applications artificial intelligence in a wide range of problems of practical and/or academic interests.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)	TBC		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)	
A	Demonstrate thorough grasp of the subject. Show strong analytical and critical abilities and logical thinking, with evidence of original thought. Insightful use and critical analysis / evaluation of information drawn from a full range of high quality sources and to quote/reference aptly. Critical use of data and results to draw appropriate and insightful conclusions. Apply highly effective organizational and presentational skills. [Work of A+ should show considerable additional work beyond that is required in wider areas relevant to the topic.]
B	Demonstrate substantial grasp of the subject. Evidence of analytical and critical abilities and logical thinking. Critical use of relevant information from sources, showing ability to make meaningful comparisons between different secondary interpretations and to quote/reference aptly. Correct use of data of results to draw appropriate conclusions. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete grasp of the subject. Evidence of some analytical and critical abilities and logical thinking. Use of relevant information from sources, showing ability to make comparisons between different interpretations and to quote/reference aptly. Mostly correct but some erroneous use of data and results to draw appropriate conclusions. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited grasp, with retention of some relevant information, of the subject. Evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Demonstrate use and reference of several sources, but mainly through summary rather than analysis and comparison. Limited ability to use data and results to draw appropriate conclusions. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate evidence of little or no grasp of the knowledge and understanding of the subject. Evidence of little or lack of analytical and critical abilities, logical and coherent thinking. Limited use of secondary sources and no critical comparison of them. Misuse of data and results and/or unable to draw appropriate conclusions. Organization and presentational skills are minimally effective or ineffective.

Course Type	Project-based course

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Reading / Self study		120

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Dissertation	written report	60	
	Oral presentation	oral presentation & in-class discussion	40	

STAT2601	**Probability and statistics I (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K P Wat, Statistics & Actuarial Science *(watkp@hku.hk)*		
Teachers Involved	(Dr K P Wat,Statistics & Actuarial Science)		
Course Objectives	The discipline of statistics is concerned with situations in which uncertainty and variability play an essential role and forms an important descriptive and analytical tool in many practical problems. Against a background of motivating problems this course develops relevant probability models for the description of such uncertainty and variability.		
Course Contents & Topics	Sample spaces; Operations of events; Probability and probability laws; Conditional probability; Independence; Discrete random variables; Cumulative distribution function (cdf); Probability mass function (pmf); Bernoulli, binomial, geometric, and Poisson distributions; Continuous random variables; Cumulative distribution function (cdf); Probability density function (pdf); Exponential, Gamma, and normal distributions; Functions of a random variable; Joint distributions; Marginal distributions; Independent random variables; Functions of jointly distributed random variables; Expected value; Variance and standard deviation; Covariance and correlation.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	understand the basic concepts in probability theory	
	CLO 2	gain some insights to statistics and inference	
	CLO 3	solve real-world problem by using probability calculations	
	CLO 4	pursue their further studies in statistics	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass or already enrolled in MATH2014, or (MATH2101 and MATH2211), for students admitted in 2014 or thereafter; or Pass in MATH1013, or already enrolled in this course, for students admitted in 2013 or before; or Pass in MATH1851 and MATH1853, for students admitted in 2013 or before; and Not for students who have passed in STAT1603, or already enrolled in this course; Not for students who have passed in STAT2901, or already enrolled in this course; and Not for BSc(ActuarSc) students.		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May
Grade Descriptors (A+ to F)	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting	**Methods**	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials, and class test(s))	30	CLO 1,2,3
	Examination	One 2-hour written examination	70	CLO 1,2,3

Required/recommended reading and online materials	DeGroot, M.H. and Schervish, M.J. (2014). Probability and Statistics (4th edition). Boston: Addison-Wesley. Ross, S.M. (2014). A First Course in Probability (9th edition). Upper Saddle River: Prentice Hall. Miller, I. and Miller, M. (2014). John E. Freund's Mathematical Statistics with Applications (8th edition). Boston: Prentice Hall. Hogg, R.V., McKean J.W., and Craig, A.T. (2013). Introduction to Mathematical Statistics (7th edition). Boston: Prentice Hall. Hogg, R. V. & Tanis E. A. and Zimmerman, D.L. (2015). Probability and Statistical Inference (9th edition). Boston: Pearson.
Course Website	http://moodle.hku.hk

STAT2602	**Probability and statistics II (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr K Zhu, Statistics & Actuarial Science *(mazhuke@hku.hk)*		
Teachers Involved	(Dr K Zhu,Statistics & Actuarial Science) (Dr Z Liu,Statistics & Actuarial Science)		
Course Objectives	This course builds on STAT2601, introducing further the concepts and methods of statistics. Emphasis is on the two major areas of statistical analysis: estimation and hypothesis testing. Through the disciplines of statistical modelling, inference and decision making, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of real-life data.		
Course Contents & Topics	1. Overview: random sample; sampling distributions of statistics; moment generating function; large-sample theory: laws of large numbers and Central Limit Theorem; likelihood; sufficiency; factorisation criterion; 2. Estimation: estimator; bias; mean squared error; standard error; consistency; Fisher information; Cramer-Rao Lower Bound; efficiency; method of moments; maximum likelihood estimator; 3. Hypothesis testing: types of hypotheses; test statistics; p-value; size; power; likelihood ratio test; Neyman-Pearson Lemma; generalized likelihood ratio test; Pearson chi-squared test; Wald tests; 4. Confidence interval: confidence level; confidence limits; equal-tailed interval; construction based on hypothesis tests.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	apprehend the objectives of statistics and its relation to probability theory	
	CLO 2	relate a real-life problem to a formal framework for statistical inference	
	CLO 3	conduct standard parametric statistical inference by means of estimation and hypothesis testing	
	CLO 4	reckon the general applicability of statistics in a broad range of subject areas	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2601; and Not for students who have passed in STAT3902, or already enrolled in this course.		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May

Grade Descriptors (A+ to F)		
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting				
	Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials and a class test)	25	CLO 1,2,3,4
	Examination	One 2-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Berry, D.A. & Lindgren, B.W. (1996). Statistics: Theory and Methods. Duxbury: Belmont. Bickel, P.J. & Doksum, K.A. (2001). Mathematical Statistics: Basic Ideas and Selected Topics. Prentice Hall: Upper Saddle River, N.J. Hogg, R.V. & Craig, A.T. (1989). Introduction to Mathematical Statistics. Macmillan: New York. Miller, I. & Miller, M. (2004). John E. Freund's Mathematical Statistics with Applications. Pearson Prentice Hall: Upper Saddle River.
Course Website	http://moodle.hku.hk

STAT3600	**Linear statistical analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr C Wang, Statistics & Actuarial Science *(stacw@hku.hk)*		
Teachers Involved	(Dr C Wang,Statistics & Actuarial Science) (Dr W T Li,Statistics & Actuarial Science)		
Course Objectives	The analysis of variability is mainly concerned with locating the sources of the variability. Many statistical techniques investigate these sources through the use of 'linear' models. This course presents the theory and practice of these models.		
Course Contents & Topics	(1) Simple linear regression: least squares method, analysis of variance, coefficient of determination, hypothesis tests and confidence intervals for regression parameters, prediction. (2) Multiple linear regression: least squares method, analysis of variance, coefficient of determination, reduced vs full models, hypothesis tests and confidence intervals for regression parameters, prediction, polynomial regression. (3) One-way classification models: one-way ANOVA, analysis of treatment effects, contrasts. (4) Two-way classification models: interactions, two-way ANOVA for balanced data structures, analysis of treatment effects, contrasts, randomised complete block design. (5) Universal approach to linear modelling: dummy variables, 'multiple linear regression' representation of one-way and two-way (unbalanced) models, ANCOVA models, concomitant variables. (6) Regression diagnostics: leverage, residual plot, normal probability plot, outlier, studentized residual, influential observation, Cook's distance, multicollinearity, model transformation.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 understand linear regression model with one or multiple independent variables CLO 2 understand ANOVA models for one and two factors CLO 3 understand general linear model with categorical and continuous independent variables		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602; and Not for students who have passed in STAT3907, or have already enrolled in this course.		
Offer in 2020 - 2021	Y 1st sem 2nd sem Offer in 2021 - 2022 : Y	**Examination**	Dec May

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials and a test)	25	CLO 1,2,3
Examination	One 2-hour written examination	75	CLO 1,2,3

Required/recommended reading and online materials

Michael H Kutner, Christopher J. Nachtsheim, John Neter, William Li: Applied Linear Statistical Models (McGraw-Hill/Irwin; 5th edition)
Berry, D. A. & Lindgren, B. W.: Statistics: Theory and Methods (Duxbury Belmont, 1996)
Draper, N. R. & Smith, H.: Applied Regression Analysis (Wiley, New York, 1998)
Krzanowski, W. J.: An Introduction to Statistical Modelling (Arnold, London, 1998)
Montgomery, D. C. & Peck, E. A.: Introduction to Linear Regression Analysis (Wiley, New York, 1992)

Course Website: http://moodle.hku.hk

STAT3612	**Statistical machine learning (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr A J Zhang, Statistics & Actuarial Science *(ajzhang@hku.hk)*		
Teachers Involved	(Dr A J Zhang,Statistics & Actuarial Science)		
Course Objectives	Machine learning is the study of computer algorithms that build models of observed data in order to make predictions or decisions. Statistical machine learning emphasizes the importance of statistical theory and methodology in the algorithmic development. This course provides a comprehensive and practical coverage of essential machine learning concepts and a variety of learning algorithms under supervised and unsupervised settings. The course materials are presented with lots of examples and reproducible codes.		
Course Contents & Topics	Data science, data exploration, generalized linear models, variable selection, basis expansion, regularization, cross-validation, tree-based methods, kernel methods, neural networks, dimension reduction, principal component analysis, cluster analysis, stochastic optimization, interpretable machine learning.		

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO 1	get familiar with the workflow of a data science or machine learning project
CLO 2	understand and apply a wide range of statistical machine learning methods, and recognize their characteristics, strengths and weaknesses
CLO 3	identify and use appropriate techniques for a particular data science project
CLO 4	evaluate the quality of the resulting model in terms of prediction accuracy and model explainability
CLO 5	apply R/Python programming for solving data-scientific problems

Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 or (STAT1603 and any University level 2 course) or STAT3902; and Pass in STAT3600 or STAT3907, or already enrolled in these courses; and Not for students who have passed in STAT4904, or already enrolled in this course; and Not for BSc(Actuarial Science) students. BSc(Actuarial Science) students are advised to take STAT4904 Statistical learning for risk modelling instead.		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	No Exam

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments		30	CLO 1,2,3,5
Project reports		30	CLO 1,2,3,4,5
Test		40	CLO 2,3

Required/recommended reading and online materials

1. James, G., Witten, D., Hastie, T. and Tibshirani, R. (2013). An Introduction to Statistical Learning with Applications in R, Springer, New York.
2. Hastie, T., Tibshirani, R. and Friedman, J. (2009). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Second Edition, Springer, New York.
3. Geron, A. (2017). Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. O'Reilly.
4. Chollet, F. and Allaire, J.J. (2018). Deep Learning with R. Manning.

Course Website: http://moodle.hku.hk

STAT3613	**Marketing analytics (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Dr C W Kwan, Statistics & Actuarial Science *(cwkwan@hku.hk)*		
Teachers Involved	(Dr C W Kwan,Statistics & Actuarial Science)		
Course Objectives	This course is designed to provide an overview and practical application of trends, technology and methodology used in the marketing survey process including problem formulation, survey design, data collection and analysis, and report writing. Special emphasis will be put on statistical techniques particularly for analysing marketing data including market segmentation, market response models, consumer preference analysis and conjoint analysis. Students will analyse a variety of marketing case studies.		
Course Contents & Topics	Marketing decision models, Market response models, Survey research, Statistical methods for segmentation, Statistical methods for positioning, Statistical methods for new product design		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 develop hands-on skills of curve fitting and analyzing data with SAS procedures or R packages CLO 2 understand marketing decision models CLO 3 understand cluster analysis, factor analysis, multidimensional scaling, correspondence analysis, conjoint analysis, choice models, confirmatory factor analysis, and discriminant analysis in market segmentation, positioning and new product design		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in BIOL2102 or (ECON1280 and any University level 2 course) or (STAT1601 and any University level 2 course) or (STAT1602 and any University level 2 course) or STAT2601 or (STAT1603 and any University level 2 course) or STAT2901		
Offer in 2020 - 2021	Y 1st sem Offer in 2021 - 2022 : Y	**Examination**	Dec

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, a class test and a group project)	50	CLO 1,2,3
Examination	One 2-hour written examination	50	CLO 1,2,3

Required/recommended reading and online materials

Lattin J., Carroll J.D. and Green P.E.: Analysing multivariate data (Thomson)
Malhotra, Naresh: Marketing Research: An Applied Orientation (Pearson, 2010, 6th ed.)
Johnson R., Wichern D.: Applied Multivariate Statistical Analysis (Prentice Hall, 5th ed.)
Lilien G.L. and Rangaswamy A.: Marketing Engineering (Prentice Hall, 2003, 2nd ed.)

Course Website: http://moodle.hku.hk

STAT3622	**Data visualization (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof G Yin, Statistics & Actuarial Science *(gyin@hku.hk)*		
Teachers Involved	(Dr W Du,Statistics & Actuarial Science) (Dr Y Fan,Statistics & Actuarial Science) (Prof G Yin,Statistics & Actuarial Science)		
Course Objectives	This course will focus on how to work with statistical graphics, graphics that display statistical data, to communicate and analyze data. Students will learn a set of tools such as R to create these graphics and critically evaluate them.		
Course Contents & Topics	Grammar of graphics, visualizing patterns over time, visualizing relationship, visualizing spatial relationships, visualizing texts.		
Course Learning Outcomes	On successful completion of this course, students should be able to: CLO 1 choose the best chart that fits the data CLO 2 create a compelling visualization using computer software CLO 3 communicate effectively using statistical graphics CLO 4 critically evaluate graphics and suggest improvements		
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT2602 or STAT3902		
Offer in 2020 - 2021	Y 2nd sem Offer in 2021 - 2022 : N	**Examination**	No Exam

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Presentation	oral presentation and in-class discussion	40	CLO 1,2,3,4
Project reports	written report	60	CLO 1,2,3,4

Required/recommended reading and online materials

Yau, Nathan (2011). Visualize This: The FlowingData Guide to Design, Visualization, and Statistics. Wiley.
Tufle, Edwards R. (2001). The Visual Display of Quantitative Information. 2nd edition, Graphics Press.
Chang, Winston (2013). R Graphics Cookbook. O Reilly Media.
Murray, Dan (2013). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. Wiley.
King, Ritchie, S. (2014). Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript. Addison-Wesley.

Course Website: http://moodle.hku.hk

STAT3955	**Survival analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr J F Xu, Statistics & Actuarial Science *(xujf@hku.hk)*		
Teachers Involved	(Dr J F Xu,Statistics & Actuarial Science)		
Course Objectives	This course is concerned with how models which predict the survival pattern of humans or other entities are established. This exercise is sometimes referred to as survival-model construction.		
Course Contents & Topics	The nature and properties of parametric and nonparametric survival models will be studied. Topics to be covered include: the introduction of some important basic quantities like the hazard function and survival function; some commonly used parametric survival models; concepts of censoring and/or truncation; parametric estimation of the survival distribution by maximum likelihood estimation method; nonparametric estimation of the survival functions from possibly censored samples by means of the Kaplan-Meier estimator, the Nelson-Aalen estimator; and the kernel density estimator or the Ramlau-Hansen estimator and comparisons of k independent survival functions by means of the generalized log-rank test; parametric regression models; Cox's semiparametric proportional hazards regression model; and multivariate survival analysis.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	acquire a clear understanding of the nature of failure time data or survival data, a generalization of the concept of death and life	
	CLO 2	perform estimation for some commonly used survival models under different types of censoring mechanisms	
	CLO 3	analyze survival data using the Cox's semiparametric proportional hazards model	
	CLO 4	extend the Cox's model to a multivariate setup to accommodate multivariate survival data	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3902, or already enrolled in this course; or Pass in STAT3600 or STAT3901; Not for students who have passed in STAT3955, or already enrolled in this course.		
Offer in 2020 - 2021	N Offer in 2021 - 2022 : N	**Examination**	---

Grade Descriptors (A+ to F)		
	A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type	Lecture-based course		
Course Teaching & Learning Activities	**Activities**	**Details**	**No. of Hours**
	Lectures		36
	Tutorials		12
	Reading / Self study		100

Assessment Methods and Weighting				
	Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
	Assignments	Coursework (assignments, tutorials, and a class test)	25	CLO 1,2,3,4
	Examination	One 3-hour written examination	75	CLO 1,2,3,4

Required/recommended reading and online materials	Cox, D. R. and Oakes, D.: Analysis of Survival Data (Chapman and Hall, 1984) Hosmer, D. W. and Lemeshow, S.: Applied Survival Analysis: Regression Modeling of Time to Event Data (Wiley, 1999) Klein, J. P. and Moeschberger, M. L.: Survival Analysis: Techniques for Censored and Truncated Data (Springer Verlag, New York, 2005, 2nd ed.)
Course Website	http://moodle.hku.hk

STAT4601	**Time-series analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	---
Course Co-ordinator	Dr G Li, Statistics & Actuarial Science *(gdli@hku.hk)*		
Teachers Involved	(Dr G Li,Statistics & Actuarial Science)		
Course Objectives	A time series consists of a set of observations on a random variable taken over time. Time series arise naturally in climatology, economics, environment studies, finance and many other disciplines. The observations in a time series are usually correlated; the course establishes a framework to discuss this. This course distinguishes different type of time series, investigates various representations for the processes and studies the relative merits of different forecasting procedures. Students will analyse real time-series data on the computer.		
Course Contents & Topics	Stationarity and the autocorrelation functions; linear stationary models; linear non-stationary modes; model identification; estimation and diagnostic checking; seasonal models and forecasting methods for time series.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	recognize a stationary vs non-stationary time series	
	CLO 2	understand some basic properties of commonly used time series models such as AR (autoregressive), MA (moving average) and ARMA models	
	CLO 3	transform non-stationary time series into stationary ones	
	CLO 4	identify different time series models based on autocorrelation functions	
	CLO 5	fit a suitable AR, MA or ARMA model to real data using SAS (after transforming to stationarity if necessary)	
	CLO 6	perform goodness of fit tests for such models	
	CLO 7	do forecasting with these fitted time series models	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600; and Not for students who have passed in STAT3614, or have already enrolled in this course; and Not for students who have passed in STAT3907, or have already enrolled in this course.		
Offer in 2020 - 2021	Y 2nd sem Offer in 2021 - 2022 : Y	**Examination**	May
Grade Descriptors (A+ to F)	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1,2,3,4,5,6,7
Examination	One 2-hour written examination	60	CLO 1,2,3,4,6,7

Required/recommended reading and online materials	J. D. Cryer & K.S. Chan: Time Series Analysis with Applications in R (Springer, 2008, 2nd edition) Bovas Abraham & Johannes Ledolter: Statistical Methods for Forecasting (John Wiley & Sons, 2005, 2nd edition) W. W .S. Wei: Time Series Analysis: Univariate and Multivariate Methods (Addison-Wesley, 2006, 2nd edition) W. K. Li: Diagnostic Checks in Time Series (Chapman & Hall/CRC, 2004) Howell Tong: Non-linear Time Series: A Dynamical System Approach (Oxford University Press, 1990)
Course Website	http://moodle.hku.hk

STAT4602	**Multivariate data analysis (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	50
Course Co-ordinator	Prof T W K Fung, Statistics & Actuarial Science *(wingfung@hku.hk)*		
Teachers Involved	(Prof T W K Fung,Statistics & Actuarial Science)		
Course Objectives	In many designed experiments or observational studies, the researchers are dealing with multivariate data, where each observation is a set of measurements taken on the same individual. These measurements are often correlated. The correlation prevents the use of univariate statistics to draw inferences. This course develops the statistical methods for analysing multivariate data through examples in various fields of application and hands-on experience with the statistical software SAS.		
Course Contents & Topics	Problems with multivariate data. Multivariate normality and transforms. Mean structure for one sample. Tests of covariance matrix. Correlations: Simple, partial, multiple and canonical. Multivariate regression. Principal components analysis. Factor analysis. Problems for means of several samples. Multivariate analysis of variance. Discriminant analysis. Classification. Multivariate linear model.		
Course Learning Outcomes	On successful completion of this course, students should be able to:		
	CLO 1	analyze multivariate data with main SAS procedures, such as PROC IML, PROC REG, PROC CORR, PROC CANCORR, PROC PRINCOMP, PROC FACTOR, PROC DISCRIM, PROC CANDISC and etc	
	CLO 2	compare the mean structure of multiple measurements for one or more than one population(s) by multivariate MANOVA and profile analysis	
	CLO 3	investigate the linear associations among one/two group(s) of variables by multiple, partial and canonical correlation and multivariate regression	
	CLO 4	explore the latent linear structure of a data set with multiple measurements by principal components analysis and factor analysis	
	CLO 5	classify observations of a population with one or more than one measurements by discriminant analysis	
Pre-requisites (and Co-requisites and Impermissible combinations)	Pass in STAT3600 or STAT3907		
Offer in 2020 - 2021	Y 2nd sem Offer in 2021 - 2022 : Y	**Examination**	May
Grade Descriptors (A+ to F)	**A**	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.	
	B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.	
	C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.	
	D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.	
	Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.	
Course Type	Lecture-based course		

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and a class test)	40	CLO 1,2,3,4,5
Examination	One 3-hour written examination	60	CLO 1,2,3,4,5

Required/recommended reading and online materials

Johnson, R. A. & Wichern, D. W.: Applied Multivariate Statistical Analysis (Prentice-Hall, 2007, 6th edition)
Mardia K. V., Kent J. T., and Bibby J. M.: Multivariate Analysis (Academic Press, 1979)
Seber G. A. F.: Multivariate Observations (John Wiley & Sons, 1984)
Morrison D. F.: Multivariate Statistical Methods (McGraw-Hill, 1990, 3rd ed.)
Hair J. F., Anderson R. E., Tatham R. L., & Black W. C.: Multivariate Data Analysis (Prentice-Hall, 2006, 6th edition)
Srivastava M. S.: Methods of Multivariate Statistics (John Wiley and Sons, 2002)
SAS Manuals on-line: Use the HELP button.

Course Website http://moodle.hku.hk

STAT4610	**Bayesian learning (6 credits)**	**Academic Year**	2020
Offering Department	Statistics & Actuarial Science	**Quota**	
Course Co-ordinator	, Statistics & Actuarial Science *(ug_enquiry@saas.hku.hk)*		
Teachers Involved			
Course Objectives	This course aims to introduce Bayesian methodologies and computational techniques of Markov Chain Monte Carlo, and application in the deep learning.		
Course Contents & Topics			
Course Learning Outcomes	On successful completion of this course, students should be able to:		
Pre-requisites (and Co-requisites and Impermissible combinations)			
Offer in 2020 - 2021	N Offer in 2021 - 2022 : Y	**Examination**	---

Grade Descriptors (A+ to F)

A	Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills.
B	Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills.
C	Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills.
D	Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.
Fail	Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.

Course Type: Lecture-based course

Course Teaching & Learning Activities

Activities	**Details**	**No. of Hours**
Lectures		36
Tutorials		12
Reading / Self study		100

Assessment Methods and Weighting

Methods	**Details**	**Weighting in final course grade (%)**	**Assessment Methods to CLO Mapping**
Assignments	Coursework (assignments, tutorials, and class test(s))	25	
Examination		75	

SECTION VII Degree Regulations

REGULATIONS FOR THE DEGREE OF
BACHELOR OF ARTS AND SCIENCES IN APPLIED ARTIFICIAL INTELLIGENCE
[BASc(AppliedAI)]
For students admitted in 2019-2020 and thereafter

(See also General Regulations and Regulations for First Degree Curricula)

Definitions

AAI 1 In these Regulations, and in the Syllabuses for the degree of BASc(AppliedAI), unless the context otherwise requires

'Course' means a course of study, with a credit value expressed as a number of credit-units as specified in the syllabus.

'Credits' means the value assigned to each course to indicate its study load relative to the total load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classrooms, and includes contact hours and time spent on assessment tasks and examinations.

'Pre-requisite' means a course or a group of courses which candidates must have completed successfully or a requirement which candidates must have fulfilled before being permitted to take the course in question.

This regulation should be read in conjunction with UG 1 of the Regulations for First Degree Curricula.

Admission to the degree

AAI 2 To be eligible for admission to the degree of BASc(AppliedAI), candidates shall

(a) comply with the General Regulations;
(b) comply with the Regulations for First Degree Curricula; and
(c) satisfy all the requirements of the curriculum in accordance with these regulations and the syllabuses.

Period of study

AAI 3 The curriculum shall normally require eight semesters of full-time study, extending over not fewer than four academic years, and shall include any assessment to be held during and/or at the end of each semester. Candidates shall not in any case be permitted to extend their studies beyond the maximum period of registration of six academic years, unless otherwise permitted or required by the Board of the Faculty.

Curriculum requirements and progression in curriculum

AAI 4 (a) Candidates shall satisfy the requirements prescribed in UG 5 of the Regulations for First Degree Curricula[1], except that in the case of the Common Core Curriculum, 24 credits shall be required, comprising one course from each Area of Inquiry. Specific requirements are spelt out in the syllabuses.

(b) Candidates shall complete not fewer than 240 credits of courses.

[1] Candidates who have achieved Level 5 or above in English Language in the Hong Kong Diploma of Secondary Education Examination (HKDSE), or equivalent, are exempted from taking "CAES1000 Core University English". In exceptional circumstances, strong candidates who have achieved Level 4 may be considered for admission to the curriculum but they will be required to take "CAES1000 Core University English" as supplementary credits and complete 246 credits for graduation from the University.

(c) Candidates shall successfully complete not fewer than 96 credits of courses for the major, including 66 credits of core courses, 18-24 credits of disciplinary electives, 6-12 credits of capstone experience requirement.
(d) Candidates shall successfully complete 18 credits of BASc core courses.
(e) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the final semester of study when the number of outstanding credits required to complete the curriculum requirements may be fewer than 24 credits.
(f) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load of 288 credits for the normative period of study specified in AAI 3, save as provided for under AAI 4(g).
(g) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load of 432 credits for the maximum period of registration specified in AAI 3.

Selection of courses

AAI 5 Candidates who wish to change their selection of courses at the beginning of each semester may do so up to 2 weeks after the commencement of the semester. Requests for changes beyond the 2-week deadline will not be permitted, except for medical or other reasons accepted by the Board of the Faculty, and candidates' withdrawal from any course without permission will result in a fail grade.

Assessment

AAI 6 Candidates shall be assessed in each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits. Grades shall be awarded in accordance with UG 8 of the Regulations for First Degree Curricula.

AAI 7 Candidates are required to make up for failed courses in the following manner
(a) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or
(b) re-submitting failed coursework, without having to repeat the same course of instruction; or
(c) repeating the failed course by undergoing instruction and satisfying the assessments; or
(d) for elective courses, taking another course in lieu and satisfying the assessment requirements.

AAI 8 Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

AAI 9 There shall be no appeal against the results of examinations and all other forms of assessment.

Discontinuation of studies

AAI 10 Unless otherwise permitted by the Board of the Faculty, candidates shall be recommended for discontinuation of their studies if they have:

(a) failed to complete 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters; or
(b) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester); or
(c) exceeded the maximum period of registration specified in AAI 3.

Absence from examination

AAI 11 Candidates who are unable, because of illness, to be present at the written examinations of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the first semester of the following academic year. Any such application shall normally be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

Advanced standing

AAI 12 Advanced standing may be granted to candidates in recognition of studies successfully completed before admission to the curriculum in accordance with UG 2 of the Regulations for First Degree Curricula. Advanced credits shall not normally be included in the calculation of the GPA unless otherwise permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

Credit transfer

AAI 13 Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The number of transferred credits may be recorded in the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

Award of the degree

AAI 14 To be eligible for award of the degree of BASc(AppliedAI), candidates shall have
(a) achieved a Graduation GPA of 1.00 or above;
(b) passed a minimum of 240 credits, comprising 96 credits of the required courses of the Applied Artificial Intelligence major as prescribed in the degree of BASc(Applied AI) curriculum, and 18 credits of BASc core courses; and
(c) satisfied the requirements in UG 5 of the Regulations for First Degree Curricula, and specified in AAI 4(a).

Honours classification

AAI 15 (a) Honours classification shall be awarded in five divisions: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, Pass. The classification of honours shall be determined by the Board of Examiners for the degree in accordance with the following Graduation GPA (GGPA) scores, with all courses taken (including failed courses) carrying weightings which are proportionate to their credit values:

Class of honours	GGPA range
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate's Graduation GPA and the Board of Examiners for the degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Graduation GPA falls below the range stipulated in AAI 15(a) of the higher classification by not more than 0.1 Grade Point.

(c) A list of candidates who have successfully completed all the degree requirements shall be posted on Faculty noticeboards.

REGULATIONS FOR FIRST DEGREE CURRICULA[1]

Regulations for First Degree Curricula (for students admitted under the 4-year '2012 curriculum' to the first year in the academic year 2019-20 and thereafter)

(See also General Regulations)

UG 1 Definitions:

For the purpose of regulations and syllabuses for all first degree curricula unless otherwise defined —

An 'academic year' comprises two semesters, the first semester to commence in September and end in December, and the second semester to commence in January and end in May/June, on dates as prescribed by the Senate. It includes, normally at the end of each semester, a period during which candidates are assessed. For some curricula, a 'summer semester' may be organized in addition to the normal two semesters. Clinical curricula have extended semesters.

A 'summer semester' normally comprises seven to eight weeks of intensive timetabled teaching and assessment to commence four weeks after the end of the second semester assessment period, and to conclude about one week before the start of the next academic year.

The 'maximum period of registration' is equivalent to a period which is 150% of the curriculum's normative period of study as specified in the degree regulations, provided that where this results in a residual fraction of an academic year, the fractional period shall be extended to one full academic year.

'Degree curriculum' means the entire study requirements for the award of an undergraduate degree.

'Major programme' means the study requirements, including a capstone experience, for a single major area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 72 credits nor more than 96 credits, as prescribed in the syllabuses for a degree curriculum.

'Minor programme' means the study requirements for a single minor area of disciplinary, interdisciplinary or multidisciplinary study, accumulating not fewer than 36 credits nor more than 48 credits, as prescribed in the syllabuses for a degree curriculum.

'Professional core' refers to the study requirements, including a capstone experience, prescribed in the regulations and syllabuses for disciplinary studies in degree curricula which are not structured as major/minor programmes for reasons relating to professional qualification and/or accreditation.

'Course' means a course of study, with a credit value expressed as a number of credit-units as specified in the syllabuses for a degree curriculum.

'Disciplinary elective course' or 'Disciplinary Elective' means any course offered in the same major or minor programme or the professional core which can be taken by candidates to fulfill the curriculum requirements as specified in the syllabuses of the degree curriculum.

'Elective course' or 'Elective' means any course offered within the same or another curriculum, other than compulsory courses in the candidate's degree curriculum, that can be

[1] These regulations are applicable to candidates admitted from 2019-20 onwards. Reference in these regulations to the powers of the Boards of Faculties shall be applicable to Senate Boards of Studies which administer first degree curricula.

taken by the candidate in order to complete the credit requirements of the degree curriculum.

'Capstone experience' refers to one or more courses within the major programme or professional core which are approved by the Board of the Faculty for the purpose of integrating knowledge and skills acquired, and which are prescribed in the syllabuses of the degree curriculum.

'Syllabus' means courses taught by departments, centres, and schools, offered under a degree curriculum.

'Prerequisite' means a course or a group of courses which candidates must have completed successfully or a requirement which candidates must have fulfilled before being permitted to take the course in question.

'Corequisite' means a course which candidates must take in conjunction with the course in question.

'Credits' or 'credit-units' means the value assigned to each course to indicate its study load relative to the total study load under a degree curriculum. The study load refers to the hours of student learning activities and experiences, both within and outside the classroom, and includes contact hours and time spent on assessment tasks and examinations. Candidates who satisfactorily complete courses with a credit value earn the credits assigned to these courses.

'Grade Points' are standardized measurements of candidates' academic achievement in courses taken to satisfy the requirements of the degree curriculum and are expressed as a scale prescribed in these regulations.

'Grade Point Average' is a numerical measure of a candidate's academic achievement over a specified period of time. Each course attempted (including each failed course) is assigned a numerical value, with all courses carrying equal weighting. This numerical value is the product of grade points earned for the course and the credit value of that course. The 'Grade Point Average' is the sum of these numerical values divided by the total number of credits attempted:

$$GPA = \frac{\sum_{i} \textit{Course Grade Point} \times \textit{Course Credit Value}}{\sum_{i} \textit{Course Credit Value}}$$

(where 'i' stands for all passed and failed courses taken by the student over a specified period)

'Semester Grade Point Average' or 'Semester GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given semester.

'Year Grade Point Average' or 'Year GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) during a given academic year.

'Cumulative Grade Point Average' or 'Cumulative GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the time of calculation.

'Graduation Grade Point Average' or 'Graduation GPA' is the GPA in respect of courses attempted by a candidate (including failed courses) at the point of graduation. For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core courses with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

'Assessment' refers to judgment about the quality and extent to which a student has achieved the stated learning objectives or learning outcomes. It includes all types of assessment activities which allow for such a judgment to be made. For the purpose of interpreting the relevant provisions of the Ordinance and the Statutes and where appropriate,

reference to ‘examination’ or 'examinations' in the Ordinance and the Statutes shall include and cover all forms of ‘assessment’ and its related processes.

A ‘transcript’ refers to a transcript of the record of study of a candidate, issued by the Registry of the University.

UG 2 Advanced standing:

Advanced standing may be granted to candidates in recognition of studies completed successfully before admission to the curriculum. Candidates who are awarded Advanced Standing will not be granted any further credit transfer for those studies for which Advanced Standing has been granted. The amount of credits to be granted for advanced standing shall be determined by the Board of the Faculty, in accordance with the following principles:

(a) at least half the number of credits of the degree curriculum normally required for award of the degree shall be accumulated through study at this University or from transfer of credits for courses completed at other institutions in accordance with Regulation UG 4(d); and

(b) in accordance with Statute III.5 and notwithstanding the granting of advanced and/or transfer credits, a minimum of two semesters of study at this University shall be required before a candidate is considered for the award of a first degree, other than a degree in medicine or surgery, and a minimum of four semesters of study at this University shall be required before a candidate is considered for a first degree in medicine or surgery.

Credits granted for advanced standing shall not normally be included in the calculation of the GPA unless permitted by the Board of the Faculty but will be recorded on the transcript of the candidate.

UG 3 Period of study:

The period of study of the curriculum shall be specified in the regulations governing the degree. To be eligible for award of the degree, a candidate shall fulfill all curriculum requirements within the maximum period of registration, unless otherwise permitted or required by the Board of the Faculty.

UG 4 Progression in curriculum:

(a) Candidates shall normally be required to take not fewer than 24 credits nor more than 30 credits in any one semester (except the summer semester) unless otherwise permitted or required by the Board of the Faculty, or except in the last semester of study when the number of outstanding credits required to complete the curriculum requirements is fewer than 24 credits.

(b) Candidates may, of their own volition, take additional credits not exceeding 6 credits in each semester, and/or further credits during the summer semester, accumulating up to a maximum of 72 credits in one academic year. With the special permission of the Board of the Faculty, candidates may exceed the annual study load of 72 credits in a given academic year provided that the total number of credits taken does not exceed the maximum curriculum study load for the normative period of study specified in the curriculum regulations, save as provided for under UG4(c).

(c) Where candidates are required to make up for failed credits, the Board of the Faculty may give permission for candidates to exceed the annual study load of 72 credits provided that the total number of credits taken does not exceed the maximum curriculum study load for the maximum period of registration specified in the curriculum regulations.

(d) Candidates may, with the approval of the Board of the Faculty, transfer credits for courses completed at other institutions at any time during their candidature. The

number of transferred credits may be recorded in the transcript of the candidate, but the results of courses completed at other institutions shall not be included in the calculation of the GPA. The number of credits to be transferred shall not exceed half of the total credits normally required under the degree curricula of the candidates during their candidature at the University.

(e) Unless otherwise permitted by the Board of the Faculty, candidates shall be recommended for discontinuation of their studies if they have:

(i) failed to complete successfully 36 or more credits in two consecutive semesters (not including the summer semester), except where they are not required to take such a number of credits in the two given semesters, or

(ii) failed to achieve an average Semester GPA of 1.0 or higher for two consecutive semesters (not including the summer semester), or

(iii) exceeded the maximum period of registration specified in the regulations of the degree.

UG 5 Requirements for graduation:

To be eligible for admission to the degree, candidates shall fulfill the following requirements in addition to the requirements prescribed in the regulations and syllabuses governing the degree curriculum within the maximum period of registration:

(a) successful completion of 12 credits in English language enhancement, including 6 credits in Core University English[2] and 6 credits in an English in the Discipline course[3];

(b) successful completion of 6 credits in Chinese language enhancement[4];

(c) unless otherwise prescribed in the curriculum regulations and syllabuses, successful completion of 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry[5] with not more than 24 credits of course being selected within one academic year except where candidates are required to make up for failed credits; and

(d) successful completion of a capstone experience as specified in the syllabuses of the degree curriculum.

UG 6 Exemption:

Candidates may be exempted, with or without special conditions attached, from any of the requirements in UG 5 by the Senate in exceptional circumstances. Candidates who are so

[2] Candidates who have achieved Level 5** in English Language in the Hong Kong Diploma of Secondary Education Examination, or equivalent, may at the discretion of the Faculty be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[3] (a) To satisfy the English in the Discipline (ED) requirement, candidates who have passed the ED course for a Major but subsequently change that Major are required to pass the ED course for the new Major, or either of the double Majors finally declared upon graduation irrespective of whether the second Major is offered within or outside of the candidates' home Faculty.

(b) Candidates declaring double Majors can, if they fail in the ED course for one of the Majors, either (i) re-take and successfully complete that failed ED course, or (ii) successfully complete the ED course for the other Major, irrespective of whether the Major is offered within or outside of the candidates' home Faculty.

(c) Candidates who undertake studies in double Majors or double degrees are not required to take a second ED course but may be advised by the Faculty to do so.

[4] Candidates who have not studied Chinese language during their secondary education may be exempted from this requirement and should take an elective course in lieu, see *Regulation UG6*.

[5] Candidates registered for dual degree studies are required to successfully complete 24 credits of courses in the Common Core Curriculum, selecting one course from each Area of Inquiry, within the curriculum of the first degree, as appropriate.

exempted must replace the number of exempted credits with courses of the same credit value.

UG 7 Assessment:

(a) Candidates shall be assessed for each of the courses for which they have registered, and assessment may be conducted in any combination of continuous assessment of coursework, written examinations and/or any other assessable activities. Only passed courses will earn credits.

(b) Candidates who are unable, because of illness, to be present at the written examination of any course may apply for permission to present themselves at a supplementary examination of the same course to be held before the beginning of the First Semester of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from any examination. Any supplementary examination shall be part of that academic year's examinations, and the provisions made in the regulations for failure at the first attempt shall apply accordingly.

(c) Candidates suspended under Statute XXXI shall not be allowed to take, present themselves for, and participate in any assessments during the period of suspension, unless otherwise permitted by the Senate.

(d) Candidates shall not be permitted to repeat a course for which they have received a D grade or above for the purpose of upgrading.

(e) Candidates are required to make up for failed courses in the following manner as prescribed in the curriculum regulations:

(i) undergoing re-assessment/re-examination in the failed course to be held no later than the end of the following semester (not including the summer semester); or

(ii) re-submitting failed coursework, without having to repeat the same course of instruction; or

(iii) repeating the failed course by undergoing instruction and satisfying the assessments; or

(iv) for elective courses, taking another course *in lieu* and satisfying the assessment requirements.

(f) There shall be no appeal against the results of examinations and all other forms of assessment.

UG 8 Grading system:

(a) The grades, their standards and the grade points for assessment shall be as follows[6]:

Grade	*Standard*	*Grade Point*
A+	Excellent	4.3
A		4.0
A-		3.7
B+	Good	3.3
B		3.0
B-		2.7
C+	Satisfactory	2.3
C		2.0
C-		1.7
D+	Pass	1.3
D		1.0
F	Fail	0

[6] UG 8 is not applicable to the respective Professional Core of the BDS and MBBS curricula.

(b) Special permission may be given by Senate for courses in individual curricula to be graded as 'Pass', 'Fail' or 'Distinction'. Such courses will not be included in the calculation of the GPA.

UG 9 Honours classifications:

(a) Honours classifications shall be awarded in five divisions[7]: First Class Honours, Second Class Honours Division One, Second Class Honours Division Two, Third Class Honours, and Pass. The classification of honours shall be determined by the Board of Examiners for the degree in accordance with the following Graduate GPA scores, with all courses taken (including failed courses) carrying equal weighting which are proportionate to their credit values[8]:

Class of honours	*GGPA range*
First Class Honours	3.60 – 4.30
Second Class Honours	(2.40 – 3.59)
Division One	3.00 – 3.59
Division Two	2.40 – 2.99
Third Class Honours	1.70 – 2.39
Pass	1.00 – 1.69

(b) Honours classification may not be determined solely on the basis of a candidate's Graduation GPA and the Board of Examiners for the degree may, at its absolute discretion and with justification, award a higher class of honours to a candidate deemed to have demonstrated meritorious academic achievement but whose Graduation GPA falls below the range stipulated in UG9(a) of the higher classification by not more than 0.1 Grade Point.

(c) A list of candidates who have successfully completed all degree requirements shall be posted on Faculty noticeboards.

[7] UG 9 is not applicable to the BChinMed, BDS and MBBS curricula.

[8] For students in the 2017-18 intake and thereafter who have successfully completed six Common Core courses, the calculation of Graduation GPA is subject to the proviso that either five Common Core course with the highest grades (covering all four Areas of Inquiry), or all six courses will be counted towards Graduation GPA, depending on which generates the higher Graduation GPA.

SECTION VIII Teaching Weeks

Teaching Weeks 2020-21 for Undergraduate and Taught Postgraduate Students

	SUN	MON	TUE	WED	THUR	FRI	SAT
SEP-20			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30			
OCT-20					[1]	[2]	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	[26]	27	28	29	30	31
NOV-20	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					
DEC-20			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	(24)	[25]	[26]
	27	28	29	30	<31>		
JAN-21						[1]	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						
FEB-21		1	2	3	4	5	6
	7	8	9	10	<11>	[12]	[13]
	14	[15]	16	17	18	19	20
	21	22	23	24	25	26	27
	28						
MAR-21		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	(16)	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			
APR-21					1	[2]	[3]
	4	[5]	[6]	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	
MAY-21							[1]
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	[19]	20	21	22
	23	24	25	26	27	28	29
	30	31					
JUN-21			1	2	3	4	5
	6	7	8	9	10	11	12
	13	[14]	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30			
JUL-21					[1]	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
AUG-21	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

FIRST SEMESTER: SEP 1 - DEC 23, 2020	**Week**
First Day of Teaching: Sep 1, 2020	1
	2
	3
	4
	5
	6
Reading/ Field Trip Week: Oct 12 - 17, 2020	7(Reading)
	8
	9
	10
	11
	12
	13
Last Day of Teaching: Nov 30, 2020	
Revision Period: Dec 1 - 7, 2020	14(Revision)
Assessment Period: Dec 8 - 23, 2020	1
	2
	3
	Break
	Break
SECOND SEMESTER: JAN 18 - MAY 29, 2021	Break
First Day of Teaching: Jan 18, 2021	1
	2
Class Suspension Period for the Lunar New Year:	3
Feb 12 - 18, 2021	4
	5
	6
Reading/ Field Trip Week: Mar 8 - 13, 2021	7(Reading)
	8
	9
	10
	11
	12
	13
Last Day of Teaching: Apr 30, 2021	14
Revision Period: May 3 - 8, 2021	15(Revision)
Assessment Period:	1
May 10 - 29, 2021	2
	3
	Break
	Break
	Break
OPTIONAL SUMMER SEMESTER	Break
JUN 28 - AUG 21, 2021	1
	2
	3
	4
	5
	6
	7
	8

[ ] General Holiday

( ) University Holiday (Full Day)

< > University Holiday (afternoon only)

Reading/ Field Trip Week

Revision Period

Class Suspension Period for the Lunar New Year

Assessment Period

Notes:

First Semester: 11 Mondays, 12 Tuesdays and Wednesdays, 11 Thursdays and Fridays, 12 Saturdays

Second Semester: 12 Mondays, 11 Tuesdays, 13 Wednesdays, 12.5 Thursdays, 12 Fridays, 11 Saturdays

Useful contacts and websites

Faculty of Science	Office Location	:	Ground Floor, Chong Yuet Ming Physics Building
	Tel	:	3917 2683
	Fax	:	2858 4620
	Email	:	science@hku.hk
	Website	:	https://www.scifac.hku.hk/
	(Please visit https://www.scifac.hku.hk/ for the latest updates of BSc courses, timetables, notices and forms)		
Departments/Schools			
Biological Sciences	Website	:	https://www.biosch.hku.hk/
Biomedical Sciences	Website	:	http://www.sbms.hku.hk/
Chemistry	Website	:	https://www.chemistry.hku.hk/
Earth Sciences	Website	:	https://www.earthsciences.hku.hk/
Mathematics	Website	:	https://hkumath.hku.hk/web/index.php
Physics	Website	:	https://www.physics.hku.hk/
Statistics and Actuarial Science	Website	:	https://saasweb.hku.hk/
Academic Advising Office	Tel	:	3917 0128
	Website	:	http://aao.hku.hk
Academic Services Office	Office Location	:	G04, Run Run Shaw Building
	Tel	:	2859 2433
	Fax	:	2540 1405
	Email	:	asoffice@hku.hk
	Website	:	http://www.ase.hku.hk
Common Core courses	Website	:	https://commoncore.hku.hk/
HKU Worldwide Undergraduate Exchange Programme	Website	:	https://aal.hku.hk/studyabroad/
Centre of Development and Resources for Students (CEDARS)	Tel	:	3917 2305
	Website	:	https://www.cedars.hku.hk/
University Health Service	Tel	:	3917 2501 (General enquiries) 2549 4686 (Medical appointments only)
	Website	:	http://www.uhs.hku.hk
Plagiarism	Website	:	https://tl.hku.hk/plagiarism/