CUS/17 March 2021
Agenda Item 6
File: 12/21

COMMITTEE ON UNDERGRADUATE STUDIES

Paper for: Discussion/Decision

Title: **Extended Major Program in Artificial Intelligence: Adding of "Business+Artificial Intelligence" and Electives**

Purpose: To add "Business+Artificial Intelligence" to the Extended Major Program in Artificial Intelligence for 2021-22 intake for consideration by the CUS

Submitted by: Interdisciplinary Programs Office

Prepared by: CUS Secretariat

BACKGROUND

1. The Senate, at its 152nd meeting on 8 December 2020, approved the general framework of the "Extended Major" academic structure and the Extended Major Program in Artificial Intelligence ("Major+AI"). "Engineering+AI" and "ScienceA+AI" were the first two "Major+AI" Extended Major programs approved for offering in 2021-22. In the same meeting, the Committee on Undergraduate Studies (CUS) was also delegated the authority to approve new "Major+X" programs, adding an existing Major to an existing "X", changes to "X" curriculum and deletion of "Major+X" or "X".

2. While the School of Business and Management (SBM) did not participate in the admission of "Major+AI+ via JUPAS 2021, the School is interested in offering the Extended Major via the Major selection for the 2021-2022 intake. The Interdisciplinary Programs Office (IPO) has therefore put forth a proposal on "Business+AI" Extended Major program for consideration and approval by the CUS. The proposal was endorsed by the Interdisciplinary Undergraduate Studies Committee (IUSC) at its meeting on 19 February 2021.

PROPOSED ARRANGEMENTS

3. 10 SBM Majors will participate in the "Business+AI" Extended Major Program. They are:

a) Professional Accounting (ACCT)
b) Economics (ECON)
c) Finance (FINA)
d) Global Business (GBUS)
e) Information Systems (IS)
f) Marketing (MARK)
g) Management (MGMT)
h) Operations Management (OM)
i) Economics and Finance (ECOF)
j) Quantitative Finance (QFIN)

4. The initial quota is 30. It can be increased for future cohorts if the demand is high and the curriculum is proven manageable by "Business+AI" students. To help students make informed decisions, the declaration of the "Business+AI" for SBM students will take place only after Year 2 Winter Term, which is after Major declaration in Year 2 Fall Term.

5. The "Business+AI" Extended Major program proposal, with details on the curriculum and the sample pathways, are presented in Appendix 1.

6. IPO and participating Schools have also taken the opportunity to review the list of electives offered under the "Major+AI" curriculum in view of the potential increase in intake. To provide students from different backgrounds with more choices, in terms of both variety and level, the list of electives for the "Major+AI" will be expanded (Appendix 2).

ACTION SOUGHT

7. CUS is invited to consider and approve as appropriate:
   (a) the proposed addition of "Business+AI" to the Extended Major Program in AI, effective 2021-22 intake (via Major selection exercise only), as presented in Appendix 1; and
   (b) addition of electives to "Major+AI" program (Appendix 2).

The HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
Interdisciplinary Undergraduate Studies Committee

Adding "Business+AI" to "Major+X" Extended Major Program

BACKGROUND

1. The Senate, at its 152nd meeting on 8 December 2020, approved the general framework of the new academic structure "Extended Major" and the Extended Major Program in Artificial Intelligence (hereunder referred to as "Major+AI"). "Engineering+AI" and "ScienceA+AI" are the first two "Major+AI" Extended Major programs approved for offering in 2021-22.

2. In the meetings of SBM's School Administrative Committee (SAC) and the Committee on Undergraduate Programs (CUP), Department Heads and UG Coordinators reviewed the final proposal of "Major+X" Extended Major for SENG and SSCI for the 2021 intake. Although SBM has decided not to participate in the admission of "Major+AI" Extended Major via JUPAS 2021, members of both Committees' expressed the interest to offer "Major+AI" via major selection for the same intake.

3. SBM met with representatives from SENG, SSCI, IPO, AI-XAC and CSE on 30 November 2020 to discuss the preliminary proposal for "Business+AI" Extended Major program. Based on the feedback from meeting participants, SBM adjusted the quota and offered support in offering and coordinating AI courses (see Attachment 1).

4. The following paragraphs outlined the proposal for "Business+AI" program.

PROPOSAL FOR "BUSINESS+AI" EXTENDED MAJOR PROGRAM

5. Participating Majors and Quota

   a) A total of 10 SBM majors would participate in the "Business+AI" Extended Major program via major selection, namely Professional Accounting (ACCT), Economics (ECON), Finance (FINA), Global Business (GBUS), Information Systems (IS), Marketing (MARK), Management (MGMT), Operations Management (OM), Economics and Finance (ECOF), and Quantitative Finance (QFIN).

   b) The quota of "Business+AI" Extended Major program for 2021/22 intake is 30. Hence, the maximum intake of "Major+AI" will be increased from 260 to 290.

Route	First-Year-First-Degree Quota	Major Selection Quota	Intake Size
Program-based Admission (PBA)	ScienceA+AI : 40 Engineering+AI : 150		190
School-based Admission (SBA)		ScienceA+AI : 40 Engineering+AI : 30 Business+AI : 30	100
Total			290

   c) The quota could be increased for future cohorts if the demand is high and the curriculum is proven manageable by "Business+AI" students.

6. Application Timeline

Although it would be best to align with SENG and SSCI to offer the AI Extended Major during the major selection exercise in Year 1 Spring (i.e. Spring 2022), SBM have concerns about students' choosing the AI Extended Major without knowing their major program (as majority of SBM students declare major in Year 2 Fall). It was proposed that the declaration of AI by SBM students of 2021/22 intake should happen **at the end of the third term** in Winter 2023 after all SBM students have declared a major, considering that students may want to ensure that there are synergies between their major and AI before making a decision. This will hopefully reduce the dropout rate.

7. Advising

a) SBM advising team would advise students on the challenge posed by technical AI courses and the rigorous workload (average of two AI courses per term). SBM would also ask students' preference for the AI extended major in the first term to estimate the no. of interested students and offer them proper advising.

b) Students not qualified or ready for the AI extended major would not be enrolled into the "Business+AI" program. SBM is fine to tighten the enrollment requirement whenever necessary, e.g. by setting more subject requirements.

8. Tentative Selection Criteria

a) Eligibility: Meeting the admission cutoff of the 2021 intake of "Engineering/ScienceA+AI"

b) Minimum Requirement: CGA at B or above, and B- in both MATH1014 and ISOM2020

c) Ranking Criteria: CGA of Fall 2022-23 (50%) as well as XCGA (50%) based on a combination of courses as listed below:

- MATH1012/1013 Calculus IA/B*
- MATH1014 Calculus II
- ISOM2020 Coding for Business
- ISOM2500 Business Statistics
- ISOM2600 Introduction to Business Analytics

** MATH1020 considered meeting the requirement if transferred.*

9. Capstone Projects

a) Following the approved "Major+X" framework, "Major+AI" students from majors that have capstone project/FYP requirement will register capstone project/FYP offered by their major PLUS IDP04990 "Interdisciplinary Capstone Design" (0 credit), which together constitute "FYP+" in the course registration system and ensure that the capstone project/FYP have strong "AI" elements. Those from majors that do not require capstone project/FYP should take IDP04991 "Interdisciplinary Capstone Project" (3 credits) designed for AI.

b) Currently, except GBUS and QFIN, all SBM majors do not require a capstone project. Therefore, students from all participating majors except GBUS and QFIN will enroll in IDP04991 in their final year.

c) "GBUS+AI" students should take IDP04991 (3 credits) in addition to GBUS's Capstone Project (GBUS4910 Capstone Project) where AI is not a necessary component in it.

d) "QFIN+AI" students should take either i) FINA4803 Quantitative Trading (QFIN Capstone Project) with AI elements and IDP04990 (0 credit) or ii) IDP04991 (3 credits) to fulfill the AI Extended Major requirement on capstone project.

e) Students taking IDP04991 (3 credits) are required to take 6 credits of AI electives; those taking capstone project of the major and IDP04990 (0 credit) will take 9 credits of AI electives.

f) SBM faculty will jointly supervise these capstone projects with IPO faculty.

10. **SBM Courses Contributing to the AI Extended Major**
    The following SBM courses will be added to the AI Curriculum. A MGMT faculty will also represent SBM in discussion of the new ethics course for AI.
    - ACCT4720 Equity Investment with Machine Learning (3 credits)
    - ISOM3390 Business Programming in R (3 credits)

11. **Sample Study Pathways**
    a) The "Major+AI" curriculum is the same that for SENG and SSCI students (see Attachment 2).
    b) Based on the mathematics background upon admission, regular SBM students will follow either Pathways 1 or 2 (see Attachment 3) to complete their Major Foundation Courses in order to choose a major by the end of the third term the latest.
    c) Both groups will take the AI Seminar and Design Thinking Courses (IDPO2010 & IDPO2020) in the same term in Year 3 Fall.
    d) SBM would need help from CSE/SENG to enroll "Business+AI" students in Pathway 1 to take COMP1021 and those in Pathway 2 to take COMP2011 in Year 2 Spring after they declare the AI Extended Major in Winter 2022-23.

12. **Admissions 2022/23**
    SBM have decided that "Business+AI" will not participate in the Program-based Admission 2022, in view that SBM currently have many PBA routes (and may have a new program in 2022-23). The School would observe SBM students' interest in AI first.

ACTION

13. According to the procedure approved by the Senate, existing majors adding to an approved "Major+X" program do not need approval by the Senate. The proposal should be reviewed and endorsed by XAC and IUSC for recommendation to the CUS for final approval. And the entire approval process ends at the CUS.

14. IUSC is invited to consider and endorse as appropriate, the introduction of "Business+AI" to the "Major+AI" program. Upon endorsement, the proposal would be submitted to CUS for final approval.

PRESENTATION

15. The paper will be presented in IUSC meeting to be held on 19 Feb 2021.

Attachments:
1 – Proposal from SBM for "Business+AI" program
2 – Curriculum framework of "Major+AI" Extended Major program
3 – Proposed pathways for "Business+AI" program

Prepared by IPO and SBM
15 Jan 2021

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY
SCHOOL OF BUSINESS AND MANAGEMENT

MEMORANDUM

To : Professor Huamin Qu, Director of IPO

From : Professor Allen Huang, Associate Dean (Undergraduate Programs), SBM

C.c. : Professor Albert Chung and Professor Philip Mok, Associate Deans of SENG

Professor Pak Wo Leung and Professor Shing Yu Leung, Associate Deans of SSCI

Date : November 12, 2020

Subject : Requesting Quota of Major+AI Extended Major for SBM 2021 Intake via Major Selection

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At the recent meetings of the School Administrative Committee (SAC) and the Committee on Undergraduate Programs (CUP), SBM Department Heads and UG Coordinators have reviewed the final proposal of the Major+AI Extended Major offered by SENG and SSCI for the 2021 intake. Even though SBM has decided not to participate in the admission of Major+X Extended Major via JUPAS, members at both Committees have expressed the interest to offer Major+AI via major selection for the same intake. After some initial discussions with IPO and SENG, SBM would like to formally submit our request for IPO's consideration. Below is our preliminary proposal.

1. Participating Programs and Quota

   At this stage, a total of 10 SBM programs would participate in the Major+AI Extended Major through major selection and they are Professional Accounting (ACCT), Economics (ECON), Finance (FINA), Global Business (GBUS), Information Systems (IS), Marketing (MARK), Management (MGMT), Operations Management (OM), Economics and Finance (ECOF) and Quantitative Finance (QFIN). We would like to offer a total of 50 seats to our students through major selection (5 seats per program on average).

2. Application Timeline

   We understand that it would be best to align with SENG and SSCI to offer the Extended Major during the major selection exercise in Year 1 Spring (in 2022). However, when discussing about the timeline, CUP members expressed their concerns about students' choosing the AI Extended Major without knowing their major program (as majority of SBM students declare major in Year 2 Fall) and proposed that the declaration of AI should happen at the end of the third term in Winter 2023 after all SBM students have declared a major. It does make sense as students may want to ensure that there are synergies between their major and AI before making a decision. This will hopefully also reduce the dropout rate.

3. Selection Criteria

   Tentatively, below are the eligibility, minimum requirement and selection criteria:
   - Eligibility: Meeting the admission cutoff of the 2021 intake of SSCI/SENG+AI

- Minimum Requirement: B- in MATH1014
- Ranking Criteria: CGA of Fall 2022-23 (50%) as well as XCGA (50%), a combination of courses that are relevant to AI

XCGA may include the following courses if we can arrange to declare AI in Year 2 Fall:

a. MATH1012/1013 Calculus IA/B
b. MATH1014 Calculus II
c. ISOM2010 Introduction to Information Systems
d. ISOM2020 Coding for Business
e. ISOM2500 Business Statistics
f. ISOM2600 Introduction to Business Analytics
g. ISOM2700 Operations Management

4. Capstone Project

   Except GBUS, all SBM programs do not require a capstone project. Therefore, students from all programs except GBUS will enroll in IDPO4991 Interdisciplinary Capstone Project in their final year. SBM faculty will jointly supervise these capstone projects with IPO faculty.

5. Courses to be Contributed to AI Extended Major

   We understand that currently our ISOM Department has offered three courses (one background and two elective courses) in the curriculum, namely ISOM3230 Business Applications Programming, ISOM3340 Developing AI Applications and ISOM3360 Data Mining for Business Analytics. We shall further explore with Departments if more courses related to AI can be offered for the AI Extended Major.

6. Sample Study Pathways

   Based on the mathematics background upon admission, regular SBM students follow either Pathways 1 or 2 to complete their Major Foundation Courses in order to choose a major by the end of the third term the latest. Because of the two different study plans, we have prepared two sample study pathways (BSc QFIN+AI and BBA OM+AI) as enclosed for your consideration. Please note that both groups will take the seminar and design thinking courses (IDPO2010 & IDPO2020) in the same term in Year 3 Fall. We may also need to seek help from SENG/COMP to enroll SBM students in Pathway 1 to take COMP1021 and those in Pathway 2 to take COMP2011 in Year 2 Spring after they declare the AI Extended Major in Winter 2022-23.

I would be most happy to meet with you or your delegates as well as SENG/SSCI colleagues to discuss further about our proposal. Meanwhile, please feel free to contact Ms Ka Yee Lee at Ext. 7546 or via email bmkayee@ust.hk should you have any questions. Thank you for your consideration.

Allen Huang
Associate Dean (Undergraduate Programs)
School of Business and Management

Encl.

From: Ka Yee LEE
To: Matthew CHIK
Cc: Shirley Tang; Huamin Qu; Allen H HUANG; Bui Se Isabella FU
Subject: RE: Meeting on SBM participating in Major+AI [10:30am, 30 Nov]
Date: Monday, 21 December 2020 12:46:24 pm
Attachments: AI Capstone Project Requirement.msg
image001.jpg
image002.jpg

Dear Matthew,

Once again, many thanks for the meeting notes. Below are our responses to your questions (point 5a-c):

> 5a. SBM to confirm the quota of the first intake
> The quota for SBM Major+AI for 2021-22 intake via major selection is 30.
>
> 5b. SSCI and SBM to provide a list of courses which can be contributed to the AI curriculum
> The following SBM courses can be added to the AI curriculum:
> - ACCT4720 Equity Investment with Machine Learning (3 credits)
> - ISOM3390 Business Programming in R (3 credits)
>
> 5c. Schools and IPO to coordinate on the Ethics course (might also include SHSS)
> Our MGMT faculty Professor Yong Kim (yhk@ust.hk) has kindly agreed to represent the School to discuss about the new ethics course for AI.

As regards the admission of Major+AI in 2022-23, we have decided not to participate as well because we currently have many PBA routes (and may have a new program in 2022-23) and we would like to observe SBM students' interest in AI.

I've also attached the message that I sent last week about the comments from GBUS and QFIN on their capstone projects for AI for your information again.

Please feel free to contact me should you have any further questions. Many thanks again for your help!

Best,
Ka Yee

From: Matthew CHIK
Sent: Wednesday, December 2, 2020 12:47 PM
To: Allen H HUANG <acahuang@ust.hk>; Shing Yu LEUNG <masyleung@ust.hk>; Nevin L ZHANG <lzhang@ust.hk>; achung <achung@cse.ust.hk>; Philip K T MOK <eemok@ust.hk>; P. W. Leung <phleung@ust.hk>; dyyeung <dyyeung@cse.ust.hk>; Huamin Qu <huamin@cse.ust.hk>; Jimmy C H FUNG <majfung@ust.hk>; Shirley Tang <egtang@ust.hk>; Ka Yee LEE <bmkayee@ust.hk>; Patricia S C LAI <egpat@ust.hk>; Anthea CHENG <ssanthea@ust.hk>
Subject: RE: Meeting on SBM participating in Major+AI [10:30am, 30 Nov]

Dear all

Thanks for attending the zoom meeting on 30 Nov 2020. Below please find the brief notes for your reference. Kindly follow up on the action items (see Point #5) and update us by 23 Dec 2020.

1. Quota:
    - SBM was suggested to reduce the quota of the 1st cohort from 50 to 30 to ensure students taking Business+AI can manage and complete the AI extended major successfully. The quota could be increased for future cohorts if the demand is high and the curriculum is proven manageable by Business+AI students.

2. Advising:
    - SBM advising team would advise students on the challenge posed by technical AI courses and the rigorous workload (average of two AI courses per term). SBM would ask students' preference for the extended major in the first term to estimate the no. of interested students and offer them proper advising.
    - Prof Allen Huang assured that students not qualified or ready for the AI extended major would not be enrolled. The School is fine to tighten the enrollment requirement whenever necessary, e.g. setting more subject requirements.

3. Concern on course quotas:
    - COMP3211 (required course without alternatives) would be the major bottleneck limiting the expansion of Major+AI. DY noted that CSE would introduce COMP2211 in Spring 2022, which is less technical and can be an alternative of COMP3211 in the future.
    - CSE urge commitment from other participating schools to share existing AI-related courses or offer new ones for Major+AI program, in order to
        i. relieve the bottleneck to enable expansion of quota of Major+AI program,
        ii. share burden on course offering and
        iii. provide more variety and level of courses for students from different background.
    - CSE is planning to offer a Common Core Course named COMP1944 (Artificial Intelligence Ethics) starting from Fall 2021. The AI extended major will also offer IDPO4120 (Ethics in AI) as an elective course in the AI curriculum. Prof Allen Huang would check if SBM could contribute in developing ethics courses. IPO shall coordinate among Schools on offering of the ethics course.
    - SBM Year 1 students will take ISOM2020 (Coding for Business) in Year 1 Spring or Year 2 Fall as a School requirement course. They may not be able to take fundamental COMP courses to fulfill the pre-requisite requirement of COMP2011 (Programming with C++), i.e. COMP1021 or COMP1022P. As advised by CSE, SBM students could take a placement test. Students who pass the test can directly enroll into COMP2011 without having to take its prerequisites.

4. Capstone Project:
    - Prof. Huamin Qu clarified that IPO would play a coordinator role to make sure that the AI Capstone Projects have AI components. If the students' major department does not have enough faculty members specialized in AI, IPO can help coordinate the manpower for supervision of the Capstone Project.
    - Participating schools and IPO agreed that it is hard to predict the enrollment and make manpower plan at this point. It was also understood that GZ faculty and Research Assistant Professors (RAPs) could be tapped on. However, if the University could not provide sufficient resources, the quota would be inevitably adjusted downward.

5. Follow-up Items (by 23 Dec 2020):
    a. SBM to confirm the quota of the first intake
    b. SSCI and SBM to provide a list of courses which can be contributed to the AI curriculum
    c. Schools and IPO to coordinate on the Ethics course (might also include SHSS)

Cheers,
Matthew

Interdisciplinary Programs Office
The Hong Kong University of Science and Technology
Tel: +852 3469 2071

From: Matthew CHIK
Sent: Thursday, 26 November, 2020 2:18 PM
To: Allen H HUANG <acahuang@ust.hk>; Shing Yu LEUNG <masyleung@ust.hk>; Nevin L ZHANG <lzhang@ust.hk>; achung <achung@cse.ust.hk>; Philip K T MOK <eemok@ust.hk>; P. W. Leung <phleung@ust.hk>; dyyeung <dyyeung@cse.ust.hk>; Huamin Qu <huamin@cse.ust.hk>; Jimmy C H FUNG <majfung@ust.hk>; Shirley Tang <egtang@ust.hk>; Ka Yee LEE <bmkayee@ust.hk>; Patricia S C LAI <egpat@ust.hk>; Anthea CHENG <ssanthea@ust.hk>
Cc: Maggie NG <maggien@ust.hk>
Subject: RE: Meeting on SBM participating in Major+AI [10:30am, 30 Nov]

Dear all,

Please find the meeting details as follows:
Direct Link: https://hkust.zoom.us/j/91066792633?pwd=TW5mYmRNTzdmK1NndmhUdGhrMGVQUT09
Meeting ID: 910 6679 2633
Passcode: 555968

Attached are the memo prepared by SBM and also the ppt slides to be presented during the meeting.

See you all on Monday.

Cheers,
Matthew

(For students admitted in 2021-22 under the 4-year degree) *[Revised on February 2021]*

Extended Major Program in Artificial Intelligence (AI)

Extended Major is an add-on element to enrich the existing majors. Students should declare their Extended Major (i) upon admission to HKUST for guaranteed enrollment in the Extended Major with a Major or (ii) during the Major Selection Exercise in Spring term of their Year 1. Students who wish to withdraw from the Extended Major should apply before the last day of the add/drop period in the first regular term of their final year of study.

The Extended Major in Artificial Intelligence is available for combination with Science Majors (BSc programs in Mathematics, Ocean Science and Techonology, Physics), any Engineering Majors or Business Majors (BBA/BSc programs in Professional Accounting, Economics, Finance, Global Business, Information Systems, Marketing, Management, Operations Management, Economics and Finance, and Quantitative Finance). It is designed for students with fundamental knowledge in calculus (e.g. MATH 1014/MATH 1020/MATH 1024), statistics (ISOM2500/MATH2411) and programming (COMP 1021/COMP 1022P/ISOM 3230), but also open to other students, given that they may be required to take one or two additional courses to acquire relevant foundation.

To graduate with an Extended Major in AI, students must have enrolled in the Extended Major, complete a minimum of 22 credits and all of its requirements, as well as the requirements of the major program of study; and have attained an average grade point of at least 2.15 in courses taken within the Extended Major.

Students must take all the Extended Major requirement, within which they must complete at least 12 single-counted credits. These 12 credits cannot be used to fulfill any other requirements for graduation except for the 120-credit degree requirement. For credit transfer, students can transfer a maximum total of 6 credits to the Extended Major program.

Extended Major Requirements

Total: 22 - 23

Required Course(s)

13-17

IDPO	2010A	Cross-disciplinary Seminar in Artificial Intelligence		0
IDPO	2020	Cross-disciplinary Design Thinking		3
COMP		Note: COMP 2011 OR COMP 2012 OR COMP 2012H		4 - 5
COMP	2011	Programming with C++	4	
COMP	2012	Object-Oriented Programming and Data Structures	4	
COMP	2012H	Honors Object-Oriented Programming and Data Structures	5	
COMP	3211	Fundamentals of Artificial Intelligence		3
COMP/IDPO/MATH		Note: COMP 4211 OR IDPO 4110 OR MATH 4432		3
COMP	4211	Machine Learning	3	
IDPO	4110	Practical Machine Learning	3	
MATH	4432	Statistical Machine Learning	3	
IDPO		*Note: IDPO 4990 OR IDPO 4991*		0 - 3
		IDPO 4990 is for students with Final Year Project requirement in their Major		
IDPO	4990	Interdisciplinary Capstone Design	0	
IDPO	4991	Interdisciplinary Capstone Project	3	

Elective Course(s)

				Minimum credit(s) required
		Students taking IDPO4990 should take a minimum of 9 credits		6-9
		Students taking IDPO4991 should take a minimum of 6 credits		
ACCT	***4720*** *(new)*	***Equity Investment with Machine Learning***	***3***	
COMP	4221	Introduction to Natural Language Processing	3	
COMP	4321	Search Engines for Web and Enterprise Data	3	
COMP	4331	Data Mining	3	
COMP	4332	Big Data Mining and Management	3	
COMP/ELEC/MATH		Note: COMP 4421 OR ELEC 4130 OR MATH 4336		
COMP	4421	Image Processing	3	
ELEC	4130	Digital Image Processing	3	
MATH	4336	Introduction to Mathematics of Image Processing	3	
COMP	4451	Game Programming	3	
COMP/DASC		Note: COMP 4462 OR DASC 3240		
COMP	4462	Data Visualization	3	
DASC	3240	Data Visualization in Science	3	
COMP	4471	Deep Learning in Computer Vision	3	
COMP	4641	Social Information Network Analysis and Engineering	3	
COMP	4901K	Machine Learning for Natural Language Processing	3	
COMP	4901L	Foundations of Computer Vision	3	
DASC	***3250*** *(new)*	***Numerical Methods and Machine Learning for Data Analytics in Science***	***3***	
DASC	***4400*** *(new)*	***Data Analytics in Information Science***	***3***	
ELEC	4230	Deep Learning for Natural Language Processing	3	
IEDA	***3010*** *(new)*	***Prescriptive Analytics***	***3***	
IEDA	***3560*** *(new)*	***Predictive Analytics***	***3***	
IDPO	*4120*	*Ethics of Artificial Intelligence*	*3*	
ISOM	3340	Developing AI Applications	1	
ISOM	3360	Data Mining for Business Analytics	3	
ISOM	***3390*** *(new)*	***Business Programming in R***	***3***	
MATH	***3425*** *(new)*	***Stochastic Modeling***	***3***	
MATH	***4335*** *(new)*	***Optimization***	***3***	
PHYS	***4058*** *(new)*	***Information Physics***	***3***	
PHYS	***4811*** *(new)*	***Contemporary Applications of Physics: Machine Learning in Physics***	***1***	

The Hong Kong University of Science and Technology

School of Business and Management

An Example on Student's Pathway (2022-23 "SBA+X" Admission)

Attachment 1 (P.2)

<< *Declaration of major*

School:		**School of Business and Management**		Student's Pathways (i.e. Study Pattern)								
Department:		**Department of Finance**		Pathway 2								
Program:		BSc in Quantitative Finance **+ Extended Major in Artificial Intelligence (AI)**		Background: HKDSE 4 Core + 2 Elec Profile: Normative								
Course Offering Dept (course code prefix)	Course Code	Course Title / Courses List	Credits	Year 1 Fall	Year 1 Spring	Year 2 Fall	Year 2 Spring	Year 3 Fall	Year 3 Spring	Year 4 Fall	Year 4 Spring	**Sub-total**
School Requirements												
ISOM	2010	Introduction to Information Systems	3		3							3
ISOM	2020	Coding for Business	1		1							1
ISOM	2500	Business Statistics	3	3								3
ISOM	2600	Introduction to Business Analytics	1		1							1
ACCT	2010	Principles of Accounting I	3	3								3
ECON ECON ECON	 2103 2113	Note: ECON 2103 OR ECON 2113^ Principles of Microeconomics Microeconomics	 3 3 3	3	[3]							3
ECON ECON ECON	 2123 3123	Note: ECON 2123 OR ECON 3123 (Students who wish to pursue BSc ECOF must take ECON 3123) Macroeconomics Macroeconomic Theory I	 3 3			3						3
FINA	2303	Financial Management	3		3							3
MGMT	2010	Business Ethics and the Individual	2		2							2
MGMT	2130	Business Ethics and Social Responsibility	2					2	[2]			2
SBMT	1111	Business Student Induction	0	0								0
LABU	2040	Business Case Analyses	3			3	[3]					3
LABU	2060	Effective Communication in Business	3			[3]	3					3
MATH MATH MATH MATH MATH MATH	 1003 1012 1013 1020 1023	Note: MATH 1003 OR MATH 1012 OR MATH1013 OR MATH 1020 OR MATH 1023 Calculus and Linear Algebra Calculus IA Calculus IB Accelerated Calculus Honors Calculus I	3-4 3 4 3 4 3	3								3
		Required credits for School Requirements	33-34									33
Major Requirements												
Major Required Courses and Electives												
FINA	2101	Introduction to Finance	1			1						1
FINA	3103	Intermediate Investments	3			3						3
FINA	3203	Derivative Securities	3				3					3
FINA	3303	Intermediate Corporate Finance	3					3				3
FINA	3810	Bloomberg Market Concepts Certification	0			0						0
FINA	4803	Quantitative Trading	3								3	3
ECON	3334	Introduction to Econometrics	4				4					4
ISOM	3230	Business Applications Programming	3			3						3
MATH MATH MATH	 1014 1024	Note: MATH 1014 OR MATH 1024 (Students taken MATH 1020 to fulfill the School Requirements may ne exempted from this requirment) Calculus II Honors Calculus II	0-3 3 3		3							3
MATH MATH MATH	 2011 2023	Note: MATH 2011 OR MATH 2023 Introduction to Multivariable Calculus Multivariable Calculus	3-4 3 4					3				3
QFIN		Restricred Electives (Courses from the specified elective list, of which at least 3 credits from Area A, at least 6 credits from Area B, and at least 9 credits from Area C)	18						6	6	6	18
		Required credits for Major Required Courses and Electives	41-45									44
AI Requirements												
Recommended Background Courses												
COMP/ISOM COMP COMP ISOM	 1021 1022P 3230	Note: COMP 1021 OR COMP 1022P OR ISOM 3230 Introduction to Computer Science Introduction to Computing with Java Business Applications Programming ***Remarks:*** *1) COMP 1021 is an exclusion to ISOM 2020 . Students must complete ISOM2020 prior to COMP 1021.* *2) ISOM 3230 has ISOM 2010 as prerequisite (For non-BSc in Quantitative Finance students).*	3 3 3 3			[3]						0
MATH MATH MATH MATH	 1014 1020 1024	Note: MATH 1014 OR MATH 1020 OR MATH 1024 Calculus II Accelerated Calculus Honors Calculus II ***Remarks:*** *1) Only students who studied MATH1003 (A- or above), MATH1012, MATH1013, MATH1020 or MATH1023 are eligible to further study in these MATH courses.*	3-4 3 4 3		[3]							0
ISOM/MATH ISOM MATH	 2500 2411	Note: ISOM 2500 OR MATH 2411 Business Statistics Applied Statistics	3-4 3 4	[3]								0
		Required credits for AI Recommended Background Courses	9-11									0
Major Required Courses and Electives												
IDPO	2010A	Cross-disciplinary Seminar in Artificial Intelligence	0					0				0
IDPO	2020	Cross-disciplinary Design Thinking	3					3				3
COMP COMP COMP COMP	 2011 2012 2012H	Note: COMP 2011 OR COMP 2012 OR COMP 2012H Programming with C++ Object-Oriented Programming and Data Structures Honors Object-Oriented Programming and Data Structures	4-5 4 4 5				4					4
COMP	3211	Fundamentals of Artificial Intelligence	3					3				3
COMP/IDPO/MATH COMP IDPO MATH	 4211 4110 4432	Note: COMP 4211 OR IDPO 4110 OR MATH 4432 Machine Learning Practical Machine Learning Statistical Machine Learning	3 3 3 3						3			3
IDPO IDPO IDPO	 4990 4991	Note: IDPO 4990 OR IDPO 4991 Interdisciplinary Capstone Design Interdisciplinary Capstone Project	0-3 0 3							3		3
SBM/SENG/SSCI/IPO		AI Electives	6-9						3		3	6
		Required credits for AI Required Courses and Electives	22-26									22
University CORE												
CORE	C3 - C12	U CORE - Others	30	0	0	3	3	3	6	9	6	30
CORE	C1 & C2	U CORE - English Language	6	3	3							6
		Sub-total for University CORE	36									36
				Term load (excl. free credits)								
				15	16	16	17	17	18	18	18	
				135#								

<< *Declaration of major*

Notes:

[ ] denotes the course is also offered in other terms as indicated and students have the flexibility to take the course in one of these terms.

To graduate, students should complete at least 120 credits in approved courses. They may need to take courses additional to the required and elective courses as specified above to meet this minimum credit requirement.

>> The content of this example is not necessarily equivalent to a complete list of graduation requirements of the program. Students should refer to the Program Catalog/UG Curriculum Handbook for updated graduation requirements. For up-to-date information on course offering and scheduling, students should check it out from respective School and Department.

The Hong Kong University of Science and Technology

School of Business and Management

An Example on Student's Pathway (2022-23 "SBA+X" Admission)

<< *Declaration of major*

School:		**School of Business and Management**		Student's Pathways (i.e. Study Pattern)								
Department:		**Department of Information Systems, Business Statistics and Operations Management**		Pathway 1								
Program:		**BBA in Operations Management + Extended Major in Artificial Intelligence (AI)**		Background: HKDSE 4 Core + 2 Elec Profile: Normative								
Course Offering Dept (course code prefix)	Course Code	Course Title / Courses List	Credits	Year 1 Fall	Year 1 Spring	Year 2 Fall	Year 2 Spring	Year 3 Fall	Year 3 Spring	Year 4 Fall	Year 4 Spring	**Sub-total**
School Requirements												
ISOM	2010	Introduction to Information Systems	3			3						3
ISOM	2020	Coding for Business	1			1						1
ISOM	2500	Business Statistics	3		3							3
ISOM	2600	Introduction to Business Analytics	1			1						1
ISOM	2700	Operations Management	3		3	[3]						3
ACCT	2010	Principles of Accounting I	3	3								3
ACCT	2200	Principles of Accounting II	3				3					3
ECON ECON ECON	 2103 2113	Note: ECON 2103 OR ECON 2113^ Principles of Microeconomics Microeconomics	3 3 3	3	[3]							3
ECON ECON ECON	 2123 3123	Note: ECON 2123 OR ECON 3123 (Students who wish to pursue BSc ECOF must take ECON 3123) Macroeconomics Macroeconomic Theory I	3 3			[3]	3					3
FINA	2303	Financial Management	3			3						3
MARK	2120	Marketing Management	3		3	[3]						3
MGMT	2010	Business Ethics and the Individual	2	2								2
MGMT	2110	Organizational Behavior	3		[3]	3						3
MGMT	2130	Business Ethics and Social Responsibility	2					2	[2]			2
SBMT	1111	Business Student Induction	0	0								0
LABU	2040	Business Case Analyses	3			3	[3]					3
LABU	2060	Effective Communication in Business	3			[3]	3					3
MATH MATH MATH MATH MATH MATH	 1003 1012 1013 1020 1023	Note: MATH 1003 OR MATH 1012 OR MATH1013 OR MATH 1020 OR MATH 1023 Calculus and Linear Algebra Calculus IA Calculus IB Accelerated Calculus Honors Calculus I	3-4 3 4 3 4 3	3								3
Required credits for School Requirements			45-46									45
Major Requirements												
Major Required Courses and Electives												
ISOM	3710	Business Modeling and Optimization	4				4					4
ISOM	3770	Global Supply Chain Management	4					4				4
ISOM		OM Electives (Any 4 ISOM courses coded between 3500 and 3999; 4500 and 4999. Students taking the Business Analytics Option can only use courses in the specificed elevtive list to fulfill this requirement.)	12						6	3	3	12
Required credits for Major Required Courses and Electives			20									20
Option Requirements												
Business Analytics Option												
ISOM	3360	Data Mining for Business Analytics	3					3	[3]			3
ISOM	3900	Decision Analytics	3						3			3
Required credits for Business Analytics Option			6									6
AI Requirements												
Recommended Background Courses												
COMP/ISOM COMP COMP ISOM	 1021 1022P 3230	Note: COMP 1021 OR COMP 1022P OR ISOM 3230 Introduction to Computer Science Introduction to Computing with Java Business Applications Programming ***Remarks:*** *1) COMP 1021 is an exclusion to ISOM 2020 . Students must complete ISOM2020 prior to COMP 1021.* *2) ISOM 3230 has ISOM 2010 as prerequisite (For non-BSc in Quantitative Finance students).*	3 3 3 3				3					3
MATH MATH MATH MATH	 1014 1020 1024	Note: MATH 1014 OR MATH 1020 OR MATH 1024 Calculus II Accelerated Calculus Honors Calculus II ***Remarks:*** *1) Only students who studied MATH1003 (A- or above), MATH1012, MATH1013, MATH1020 or MATH1023 are eligible to further study in these MATH courses.*	3-4 3 4 3		3	[3]						3
ISOM/MATH ISOM MATH	 2500 2411	Note: ISOM 2500 OR MATH 2411 Business Statistics Applied Statistics	3-4 3 4		[3]							0
Required credits for AI Recommended Background Courses			9-11									6
Major Required Courses and Electives												
IDPO	2010A	Cross-disciplinary Seminar in Artificial Intelligence	0					0				0
IDPO	2020	Cross-disciplinary Design Thinking	3					3				3
COMP COMP COMP COMP	 2011 2012 2012H	Note: COMP 2011 OR COMP 2012 OR COMP 2012H Programming with C++ Object-Oriented Programming and Data Structures Honors Object-Oriented Programming and Data Structures	4-5 4 4 5					4				4
COMP	3211	Fundamentals of Artificial Intelligence	3							3		3
COMP/IDPO/MATH COMP IDPO MATH	 4211 4110 4432	Note: COMP 4211 OR IDPO 4110 OR MATH 4432 Machine Learning Practical Machine Learning Statistical Machine Learning	3 3 3 3						3			3
IDPO IDPO IDPO	 4990 4991	Note: IDPO 4990 OR IDPO 4991 Interdisciplinary Capstone Design Interdisciplinary Capstone Project	0-3 0 3								3	3
SBM/SENG/SSCI/IPO		AI Electives	6-9						3	3		6
Required credits for AI Required Courses and Electives			22-26									22
University CORE												
CORE	C3 - C12	U CORE - Others	30	0	3	3	0	0	3	9	12	30
CORE	C1 & C2	U CORE - English Language	6	3	3							6
Sub-total for University CORE			36									36
				Term load (excl. free credits)								
				14	18	17	16	16	18	18	18	
				129 (w/o option) | 135 (w/ option)#								

<< *Declaration of major*

Notes:

[ ] denotes the course is also offered in other terms as indicated and students have the flexibility to take the course in one of these terms.

To graduate, students should complete at least 120 credits in approved courses. They may need to take courses additional to the required and elective courses as specified above to meet this minimum credit requirement.

>> The content of this example is not necessarily equivalent to a complete list of graduation requirements of the program. Students should refer to the Program Catalog/UG Curriculum Handbook for updated graduation requirements. For up-to-date information on course offering and scheduling, students should check it out from respective School and Department.

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
Changes to Existing Undergraduate Program

Section 1: General Information

a) The program is a : Major ○ Minor ○ Other ◉

b) Title: Extended Major in Artificial Intelligence

c) School/IPO recommending the change(s): Interdisciplinary Programs Office

d) Offering Department(s): Interdisciplinary Programs Office

e) Effective term for the change(s) proposed: Fall 2021-22

f) Changes proposed applicable to student cohorts of: Fall 2021-22 and thereafter

Section 2: Submission and Recommendation

Proposal Submission and Recommendation

Offering Department/Program Unit	*Position*	*Name*	*Date*
Interdisciplinary Programs Office	Director	Prof Huamin QU	3-Feb-21

Recommending School/IPO	*Position*	*Name*	*Date*
Interdisciplinary Programs Office	Chair of IUSC	Prof Jimmy FUNG	22-Feb-21

Concurrence

School/Dept/Program Unit	*Position*	*Name*	*Date*
School of Engineering	Associate Dean	Prof Philip MOK	21-Jan-21
School of Science	Associate Dean	Prof Pak Wo LEUNG	28-Jan-21
School of Business and Management	Associate Dean	Prof Allen HUANG	29-Jan-21
School of Humanities & Social Science	Associate Dean	Prof Carine YIU	27-Jan-21
Dept of Accounting	Head of Dept	Prof Mingyi HUNG	27-Jan-21
Dept of Industrial Engineering & Decision Analytics	UG Coordinator	Prof Jiheng ZHANG	21-Jan-21
Dept of Information Systems, Business Statistics & Operations Management	Deputy Head of Dept	Prof Kai Lung HUI	21-Jan-21
Dept of Mathematics	UG Coordinator	Dr Tsz Kin LAM	21-Jan-21
Dept of Physics	UG Coordinator	Prof Bradley A FOREMAN	22-Jan-21
X Academic Committee	UG Coordinator	Prof Huamin QU	3-Feb-21

Section 3: Recommended Change

The following changes are recommended:

☐ Change to the program title

New program title: _____

■ Change in enrollment requirements

Please specify the change: Pending approval of Business+AI program, business students of 2021/22 cohort are also eligible for enrolling into the AI Extended Major through Major Selection Exercise in Winter 2023. The tentative quota of the Business+AI program is 30.

☐ Addition/deletion* of an Option, track or concentration of a major *(*delete as appropriate)*

Name of Option/track/concentration:

☐ Changes to required course(s)

Course code: ☐ Add ☐ Remove

Course code: ☐ Add ☐ Remove

Course code: ☐ Add ☐ Remove

■ Changes to elective requirements

(Details: Add courses to the list of elective requirements)

☐ Other changes

(Details:)

Section 4: Documentation Required

		Please indicate if documentation is attached
a)	Reasons for proposing the changes	■
b)	Feedback from stakeholders, including student feedback	☐
c)	Revised curriculum	■
d)	Revised sample student pathways	☐
e)	Impact on educational objectives and intended learning outcomes	☐
f)	Transitional arrangements	☐

a) Reasons for proposing the changes

In anticipation of the large intake (290 students per cohort), IPO and participating schools propose adding the following courses to the elective requirement to share burden on course offering and provide more variety and levels of courses for students from different backgrounds.

Estimated enrollment

Major+X program	2021-22	2022-23	2023-24	2024-25
Engineering + AI	150	150 + 180	150 + 180 + 180	150 + 180 + 180 + 180
Science A + AI	40	40 + 80	40 + 80 + 80	40 + 80 + 80 + 80
Business + AI		30	30 + 30	30 + 30 + 30
Total	190	480	770	1060

Courses proposed for Major+AI elective requirement:

ACCT	4720	Equity Investment with Machine Learning	3-credit
DASC	3250	Numerical Methods and Machine Learning for Data Analytics in Science	3-credit
DASC	4400	Data Analytics in Information Science	3-credit
IEDA	3010	Prescriptive Analytics	3-credit
IEDA	3560	Predictive Analytics	3-credit
ISOM	3390	Business Programming in R	3-credit
MATH	3425	Stochastic Modeling	3-credit
MATH	4335	Optimization	3-credit
PHYS	4058	Information Physics	3-credit
PHYS	4811	Contemporary Applications of Physics: Machine Learning in Physics	1-credit

The revised curriculum is available in Attachment 2 to Appendix 1 “Adding “Business+AI” to “Major+X” Extended Major Program”.