國立陽明交通大學理學院科學學士學位學程跨域學程實施要點

National Yang Ming Chiao Tung University
Undergraduate Honors Program of Interdisciplinary Science
Implementation Guidelines for Cross-Disciplinary Program

一、依據國立陽明交通大學跨域學程實施辦法,國立陽明交通大學「理學院科學學士學位學程」(簡稱科學學士班,下稱本班)為鼓勵學生進行跨領域學習,建立跨域學習深度,協助學生拓展第二專長,提供學生可以在畢業學分不增加(或僅少量增加)情況下,修畢跨域學程,特訂定本實施要點。

Article One　　These Implementation Guidelines are prescribed by National Yang Ming Chiao Tung University Undergraduate Honors Program of Interdisciplinary Science (hereinafter refer to as Our Class) based on NYCU Cross-Disciplinary Program Implementation Regulations to provide the opportunity for students to proceed cross-disciplinary learning without increasing graduate credits (or only a few extra credits) in order to encourage students to conduct cross-disciplinary study, build the depth of cross-disciplinary study, and assist students to expand second specialty.

二、依據國立陽明交通大學跨域學程實施辦法,跨域學程係指由陽明交通大學的學系、研究所、或學院提出模組課程,模組課程應包含該領域基礎核心知識,且總學分數以30學分為原則(最低可為28學分,最高不可超過32學分),學生修習跨域學程,其課程將包含所屬學系的跨域學程模組課程以及第二專長系所或學院的跨域學程模組課程,並可於畢業證書上加註第二專長模組

課程為跨域專長。

Article Two　　The cross-disciplinary program here means the cross-disciplinary module curriculum proposed by the departments, institutes or colleges in National Yang Ming Chiao Tung University. Module curriculum should include the core knowledge curriculum of the field and the total credits will be based on 30 credits (the minimum 28 credits and no more than 32 credits). The cross-disciplinary program that students take will include the cross-disciplinary program module curriculum of the department they belong to as well as the cross-disciplinary program module curriculum from the second specialty department, institute or college. The module curriculum of the second specialty could be remarked as "Cross-Disciplinary Specialty" on the diploma.

三、本要點修業規定

　　Article Three　　Policies of these Guidelines

1. 本班學生放棄雙學位但欲選擇本班做為其跨域專長者

1. For students of our class who give up dual-degree (major in Department of Electrophysics, Department of Applied Mathematics or Department of Applied Chemistry) and would like to take cross-disciplinary program

(1) 得於每學年度公告申請期限內向本班提出申請，經審查通過後，即可進入跨域學程。

(1) The application could be submitted to our class within the dates of annual announcements by faculty. Students could only take the cross-disciplinary program after the application is approved by the Curricular Committee at our class.

(2) 學生修習本班跨域學程的課程，列示於「理學院科學學士學位學程跨域模組課程必修科目表B」，其課程包含：校訂共同必修24學分、原主修學系（電子物理學系、應用數學系、應用化學系）基礎必修課程、原主修學系跨域模組課程、以及本班跨域模組課程，畢業學分以128學分為原則。於畢業證書主修學系名稱後加註「科學」為其跨域專長。

(2) The courses of cross-disciplinary program studied by students in our class should be listed on "The Required Course List for the students at our department study cross-disciplinary program in the Undergraduate Honors Program of Interdisciplinary Science **B**". The courses include required courses of the university (including 24 credits of general education subjects), core curriculum at the major department (Department of Electrophysics, Department of Applied Mathematics, Department of Applied Chemistry), cross-disciplinary module curriculum at the major department, and the cross-disciplinary module curriculum at our with at least 128 graduate credits. The "Science" will be remarked as their cross-disciplinary specialty after the title of their major department on the diploma.

(3) 學生修習跨域學程，若無法修畢跨域學程課程，得放棄跨域學程，改修習原主修學系的學士學位課程。

(3) Students who study for cross-disciplinary program but are not able to complete the program, they shall give up the cross-disciplinary program and transfer to study for the bachelor degree program at their major department.

2. 外系學生欲選擇本班做為其跨域專長者

2. For students of other departments who would like to study for cross-disciplinary program and choose our class as their cross-disciplinary specialty

   (1) 得於每學年度公告申請期限向其所屬學系（以下簡稱原系）提出申請，通過原系以及本班的雙邊審查後，方可進入跨域學程。

   (1) They could submit the application to the department that they belong to within the dates of annual announcements by faculty. They could only take the cross-disciplinary program after approved by both their original department and our class.

   (2) 外系學生修讀跨域學程且選擇本班做為其跨域專長者，其課程包含：校訂共同必修24學分、原系基礎必修課程、原系跨域模組課程、以及列示於「理學院科學學士學位學程跨域模組課程必修科目表B」的模組課程，畢業學分以128學分為原則，並於畢業證書原系名稱後加註「科學」為其跨域專長。

   (2) The courses for the students of other departments who would like to study for cross-disciplinary program and choose our class as their cross-disciplinary specialty include required courses of the university (including 24 credits of general education subjects), core curriculum at their original department, cross-disciplinary module curriculum at their original department, and the module curriculum listed on "The Required Course List for the students study cross-disciplinary module curriculum in the Undergraduate Honors Program of Interdisciplinary Science **B**" with at least 128 graduate credits. The "Science" will be remarked as their cross-disciplinary specialty after the title of their original department on the diploma.

3. 本班學生放棄雙學位但選擇本班學士學位學程欲修習跨域學程者

3. For students of our class who give up dual-degree (major in Undergraduate Honors Program of Interdisciplinary Science) and would like to take cross-disciplinary program

   (1) 得於每學年度公告申請期限向本班提出申請，申請時註明欲申請的第二專長系所或學院，本班將於學期中公告須準備的審查資料、當學年度開放給本班學生修讀跨域學程的名額及申請期限等資訊，申請案經本班課程委員會審查通過後，需送到第二專長系所或學院審查，通過雙邊審查後，方可進入跨域學程。

   (1) The application could be submitted to our class within the dates of annual announcements by faculty. The department or college of the second specialty that the student would like to apply for must be remarked on the application form, and the information of evaluation documents needed to be prepared as well as the quota opened to the students of our department to study for this program in the given year, and the application deadline would be announced during the semester. The application should be sent to the department or college of the second specialty for evaluation after it is approved by the Curricular Committee at our class. Students could only take the cross-disciplinary program after evaluation by both sides.

   (2) 學生修習跨域學程的課程，列示於「理學院科學學士學位學程跨域學程本班學生必修科目表A」，其課程包含：校訂共同必修24學分、本班基礎必修課程、本班跨域模組課程、以及第二專長系所或學院的跨域模組課程（以下簡稱他系跨域模組課程），畢業學分以128學分為原則。他系跨域模組課程認定為跨域專長，於畢業證書本班名稱後加註此跨域專長。

   (2) The courses of cross-disciplinary program studied by students in our class should be listed on "The Required Course List for the students at our class study cross-disciplinary program in the

Undergraduate Honors Program of Interdisciplinary Science **A**" The courses include required courses of the university (including 24 credits of general education subjects), core curriculum at our class, cross-disciplinary module curriculum at our class, and the cross-disciplinary module curriculum of the second specialty department or college (hereinafter referred to as cross-disciplinary module curriculum at other department) with at least 128 graduate credits. The cross-disciplinary module curriculum at other department would be recognized as cross-disciplinary specialty, and it will be remarked after the title of our class on the diploma.

(3) 學生修習跨域學程，若無法修畢跨域學程課程，得選擇放棄跨域學程，改修習本班的學士學位課程。

(3) For students at our class who study for cross-disciplinary program but are not able to complete the program, they shall give up the cross-disciplinary program and transfer to study for the bachelor degree of Undergraduate Honors Program of Interdisciplinary Science.

四、本班指定一名專任教師擔任跨域學程導師，與外系所或學院的跨域學程導師組成導師群，專責輔導跨域學程的學生。

Article Four   Our class assigns one full-time teacher to be the mentor of the cross-disciplinary program and formed mentor group with teachers of cross-disciplinary program at other department or college to give guidance to cross-disciplinary program students.

五、為鼓勵不同系所或學院合作提出跨域共授課程，兩位以上教師開授跨領域之創新整合式課程，得依本校教師授課時數核計原則規定辦理，教師的授課鐘點數可按到場時數計，但以開課前該門課程實際簽呈為依據。

Article Five   In order to encourage different departments or colleges working together for the proposal of cross-disciplinary curriculum, the number of teaching hours for the innovating integrated curriculum offered by more than two teachers could be calculated by the actual time of teaching according to National Yang Ming Chiao Tung University Teaching Hours Accounting Principle; however, it will be in accordance with the official approval of the curriculum before the course starts.

六、本實施要點如有未盡事宜，悉依本校學則及其他相關規定辦理。

Article Six   If there is any unaccomplished matter of the regulation, it shall be handled in accordance with the school constitution of our university as well as other relevant regulations.

七、本實施要點由本班課程委員會議訂定，經院級、校級課程委員會通過後實施，修訂時亦同。

Article Seven These guidelines were drawn up by Curriculum Committee of our class, and approved by Curriculum Committee at college-level and university-level before putting it into practice; the same shall be done upon any amendment thereto.

理學院科學學士學位學程跨域學程 本班學生 必修科目表（A）

The Required Course List for the students at our class study cross-disciplinary program in the Undergraduate Honors Program of Interdisciplinary Science (A)

類別 Category	科目名稱 Course Name	學分 Credit	規定學分 Credit	開課系所 Department	備註 Remark
本班基礎必修 （36 學分） Core curriculum at our department （36 credits）	基礎科學研究方法與實作（一）（二）（三）（四） Introduction to Scientific Research and Implementation (I)(II)(Ⅲ)(IV)	12	9	本班 Undergraduate Honors Program of Interdisciplinary Science	
	跨領域科學專題（一）（二） Directed Studies in Interdisciplinary Science(I)(II)	6	3	本班 Undergraduate Honors Program of Interdisciplinary Science	
	物理（一）（二） Physics(I)(II)	8	8	電物系 Department of Electrophysics	
	微積分（一）（二） Calculus(I)(II)	8	8	應數系 Department of Applied Mathematics	
	物理實驗（一）（二） Physics Labs. (I)(II)	2	8	電物系 Department of Electrophysics	
	化學（一）（二） Chemistry(I)(II)	6		應化系 Department of Applied Chemistry	
	化學實驗（一）（二） Chemistry Labs. (I)(II)	2			
	微積分學而班（一）（二） Honor calculus problem solving session (I)(II)	2		應數系 Department of Applied Mathematics	
	普通生物學（一）（二）或 近代生物學（一）（二） General Biology(I)(II) or Modern Biology(I)(II)	6		本班或生科系 Undergraduate Honors Program of Interdisciplinary Science	
本班跨域模組 （28 學分） Cross-disciplinary modules at our department （28 credits）	**跨領域 Interdisciplinary：**		28	本班 Undergraduate Honors Program of Interdisciplinary Science	1.共六領域：跨領域、物理、數學、化學、大數據及 AI、智慧生醫。 2.物理、數學及化學、大數據及 AI、智慧生醫各領域中至少選修兩領域，且各領域至少修習 9 學分。 1.The curriculums are divided into SIX sectors: Interdisciplinary, Physics, Applied Mathematics, Applied Chemistry and Big Data and Artificial Intelligence, and Smart Biomedical. 2.Students should take courses at least two different sectors with at least nine credits in each of the following sectors from Physics,
	跨領域科學專題（三）（四） Interdisciplinary：Directed Studies in Interdisciplinary Science (III)(IV)	6			
	物理領域 Physics：			電物系 Department of Electrophysics	
	電子學（一）（二） Electronics(I)(II)	6			
	理論力學（一）（二） Theoretical Mechanics(I)(II)	6			
	電磁學（一）（二） Electromagnetics (I)(II)	6			
	量子力學導論（一）（二） Intro. to Quantum Mechanics(I)(II)	6			
	近代物理（一）（二） Modern Physics (I) (II)	6			
	熱物理 Thermal Physics	3			
	固態物理（一） Solid State Physics (I)	3			
	應用數學(四)(群論) Applied Mathematics IV (Group Theory)	3			
	奈米科技與應用	3			

	Nano Technology and Applications			應數系 Department of Applied Mathematics	Applied Mathematics, Applied Chemistry and Big Data and Artificial Intelligence, and Smart Biomedical sectors.

數學領域 Mathematics：	
分析導論（高等微積分）（一）（二） Introduction to Analysis(I)(II)	8
線性代數（一）（二） Linear Algebra (I)(II)	6
微分方程（一） Differential Equations(I)	3
代數（一）（二） Algebra (I)(II)	6
偏微分方程（導論） Int. to Partial Differential equations	3
計算數學 Computational Mathematics	3
離散數學 Discrete Mathematics	3
複變函數 Complex Analysis	3
機率論 Probability	3
統計學或統計方法 Statistics or Statistical Methods	3
數學軟體實作 Mathematical Software and Implementation	3

應數系
Department of Applied Mathematics

化學領域 Chemistry：	
有機化學（一）（二）（三） Organic Chemistry (I)(II)(III)	12
分析化學（一）（二） Analytical Chemistry (I)(II)	6
物理化學（一）（二）（三） Physical Chemistry (I)(II)(III)	12
無機化學（一）（二） Inorganic Chemistry (I)(II)	6
儀器分析 Instrumental Analysis	3
化學應用群論 Group Theory for Chemistry	3
神經科學導論 Introduction to Neuroscience	3

應化系
Department of Applied Chemistry

大數據及 AI 領域 Big Data and Artificial Intelligence：	
機器學習 Machine Learning	3
深度學習 Deep Learning	3
資料結構 Data Structures	3
資料探勘 Data Mining	3
人工智慧概論 Intro. to Artificial Intelligence	3

應數系
Department of Applied Mathematics
Or
資工系
Department of Computer Science
Or
生醫光電研究所
Institute of Biophotonics

		機率論 Probability	3		
		機器學習與生醫應用 Machine Learning & Biomedical Application	3		
		深度學習與生醫應用 Deep Learning and Biomedical Applications	3		
		演算法概論 Introduction to Algorithms	3		
		密碼學概論 Introduction to Cryptography	3		
		數值方法 Numerical Methods	3		
	智慧生醫領域 **Smart Biomedical**：			生醫光電研究所 Institute of Biophotonics	
		奈米化學 Nano Chemistry	3		
		生物醫學訊號與影像處理 特論 Special Topics on Biomedical Signal and Image Processing	3		
		基礎光電材料與技術 Basic Photonic Materials and Technology	3		
		醫療科技實務 Medical Technology Practice	1		
		訊號與系統 Signals and Systems	3		
		應用雷射與非線性光學 Applied Laser and Nonlinear Optics	3		
		生醫感測與微奈米操控科 技 Biosensing and Micro- /Nanomanipulation Technology	2		
		機器學習與生醫應用 Machine Learning & Biomedical Application	3		
		生醫斷層影像原理與應用 Principle and Applications of Biomedical Tomography	3		
		LabVIEW 程式設計與生醫 應用 LabVIEW Programming and Biomedical Applications	3		
		跨領域科學實驗 Interdisciplinary Scientific Experiments	1		
		深度學習與生醫應用 Deep Learning and Biomedical Applications	3		
		智慧生醫概論	2		

	Intro. of smart biomedicine				
	光學細胞顯微科技 Optical microscopy for living cells	3			
	機率論 Probability	3			
	專題研究（一） Research（1）	3		本班 Undergraduate Honors Program of Interdisciplinary Science	修課同學需於暑假期間至陽明校區生醫光電所實驗室進行專題研究
他系跨域模組 （28 學分） Cross-disciplinary modules at other department （28 credits）	本校各系所或學院所提供之跨域模組學程，擇一修畢 The cross-disciplinary modules offer by departments or colleges at our university; choose one to complete.	28			
合計 Total			校訂共同必修 24 學分 [註 1]		
最低畢業學分 Minimum Graduate Credits: 128 credits		128			

註 1：如大學部學生修習共同必修學分數超過 24 學分，本校至多可採至 40 學分於最低畢業學分內，但各學系另有規定者，從其規定。

Note 1: According to the rules prescribed by Table of General Education Subject of our university, for the students in the bachelor degree program who study general education subjects more than 24 credits, our university could calculate 40 credits to the minimum graduate credits; please follow the regulations from each department if it is specially defined.

理學院科學學士學位學程 跨域模組課程 必修科目表（B）

The Required Course List for the students study cross-disciplinary module curriculum of the Undergraduate Honors Program of Interdisciplinary Science (B)

類別 Category	科目名稱 Course Name	學分 Credit	規定學分 Credit	開課系所 Department	備註 Remark
本班跨域模組（28 學分）修畢於畢業證書加註「跨域專長：科學」 Cross-disciplinary modules at our department（28 credits） It could be remarked as "Cross-Disciplinary Specialty：Science" on the diploma after the module curriculum is completed.	基礎科學研究方法與實作(一)(二) Introduction to Scientific Research and Implementation (I) (II)	6	6	本班 Undergraduate Honors Program of Interdisciplinary Science	必修 6 學分
	基礎科學研究方法與實作(三)(四)或跨領域科學專題(一)(二)(三)(四) Introduction to Scientific Research and Implementation (Ⅲ) (IV) Directed Studies in Interdisciplinary Science(I)(II)(III)(IV)	6	6		必選 6 學分
	跨領域 Interdisciplinary：			本班 Undergraduate Honors Program of Interdisciplinary Science	
	跨領域科學專題(一)(二)(三)(四) Interdisciplinary： Directed Studies in Interdisciplinary Science(I)(II)(III)(IV)	6			
	物理領域 Physics s：			電物系 Department of Electrophysics	
	電子學(一)(二) Electronics(I)(II)	6			
	理論力學(一)(二) Theoretical Mechanics(I)(II)	6			
	電磁學(一)(二) Electromagnetics (I)(II)	6			
	量子力學導論 Int. to Quantum Mechanics	3			
	光學概論(一)(二) Introduction to Optics (I) (II)	6			
	近代物理(一)(二) Modern Physics (I) (II)	6			
	熱物理 Thermal Physics	3			
	固態物理(一) Solid State Physics (I)	3			
	應用數學(四)(群論) Applied Mathematics IV (Group Theory)	3			
	奈米科技與應用 Nano Technology and Applications	3			

	數學領域 Mathematics：			應數系 Department of Applied Mathematics	
	分析導論(高等微積分)(一)(二) Introduction to Analysis (I)(II)	8			
	線性代數(一)(二) Linear Algebra (I)(II)	6			
	微分方程 Differential Equations	3			
	代數(一) Algebra (I)	3			
	偏微分方程(導論) Int. to Partial Differential equations	3			
	計算數學 Computational Mathematics	3			
	離散數學 Discrete Mathematics	3			
	複變函數 Complex Analysis	3			
	機率論 Probability	3			
	統計學或統計方法 Statistics or Statistical Methods	3			
	數學軟體實作 Mathematical Software and Implementation	3			
	化學領域 Chemistry：			應化系 Department of Applied Chemistry	
	有機化學(一)(二)(三) Organic Chemistry (I)(II)(III)	12			
	分析化學(一)(二) Analytical Chemistry (I)(II)	6			
	物理化學(一)(二)(三) Physical Chemistry (I)(II)(III)	12			
	無機化學(一)(二) Inorganic Chemistry (I)(II)	6			
	儀器分析 Instrumental Analysis	3			
	化學應用群論 Group Theory for Chemistry	3			
	神經科學導論 Introduction to Neuroscience	3			
	大數據及 AI 領域 Big Data and Artificial Intelligence：			應數系 Department of Applied Mathematics Or 資工系 Department of Computer Science Or 生醫光電研究所 Institute of Biophotonics	
	機器學習 Machine Learning	3			
	深度學習 Deep Learning	3			
	資料結構 Data Structures	3			
	資料探勘 Data Mining	3			
	人工智慧概論 Intro. to Artificial Intelligence	3			
	機率論 Probability	3			
	機器學習與生醫應用 Machine Learning & Biomedical Application	3			
	深度學習與生醫應用 Deep Learning and Biomedical Applications	3			
	演算法概論	3			

	Introduction to Algorithms			
	密碼學概論 Introduction to Cryptography	3		
	數值方法 Numerical Methods	3		
	智慧生醫領域 Smart Biomedical：		生醫光電研究所 Institute of Biophotonics	
	奈米化學 Nano Chemistry	3		
	生物醫學訊號與影像處理特論 Special Topics on Biomedical Signal and Image Processing	3		
	基礎光電材料與技術 Basic Photonic Materials and Technology	3		
	醫療科技實務 Medical Technology Practice	1		
	訊號與系統 Signals and Systems	3		
	應用雷射與非線性光學 Applied Laser and Nonlinear Optics	3		
	生醫感測與微奈米操控科技 Biosensing and Micro-/Nanomanipulation Technology	2		
	機器學習與生醫應用 Machine Learning & Biomedical Application	3		
	生醫斷層影像原理與應用 Principle and Applications of Biomedical Tomography	3		
	LabVIEW 程式設計與生醫應用 LabVIEW Programming and Biomedical Applications	3		
	跨領域科學實驗 Interdisciplinary Scientific Experiments	3		
	深度學習與生醫應用 Deep Learning and Biomedical Applications	3		
	智慧生醫概論 Intro. of smart biomedicine	2		
	光學細胞顯微科技 Optical microscopy for living cells	3		
	機率論 Probability	3		
	專題研究(一) Research（1）	3	本班 Undergraduate Honors Program of Interdisciplinary Science	修課同學需於暑假期間至陽明校區生醫光電所實驗室進行專題研究
總學分 Total Credits		28		