

國立陽明交通大學電子物理系跨域學程實施要點

National Yang Ming Chiao Tung University Department of Electrophysics Implementation Guidelines for Cross-Disciplinary Program

本案經由本系110.9.28第一次教學與輔導委員會修正通過
 本案經由110.11.5理學院第一次課程委員會通過
 本案經由110.12.2校課程委員會通過
 本案經由110.12.16教務會議核備通過
本案經由本系111.10.25第三次教學與輔導委員會修正通過
 本案經由111.11.10理學院第一次課程委員會通過
 本案經由111.11.28校課程委員會通過
 本案經由112.03.07教務會議核備通過
本案經由本系112.3.10第八次教學與輔導委員會修正通過
 本案經由112.4.19理學院課程委員會通過
 本案經由112.05.16校課程委員會通過
 本案經由112.05.30教務會議核備通過
案經由本系113.3.21五次教學與輔導委員會修正通過
 本案經由113.4.16理學院課程委員會通過
 本案經由113.05.20校課程委員會通過

Passed at the 1st Curriculum Committee Organization of Department of Electrophysics (28 September 2021)
 Passed at the 2nd Curriculum Committee Organization of College of Science (5 November 2021)
 Passed at the 3rd NYCU Curriculum Committee (2 December 2021)
Approved and saved for reference in the 2nd Academic Affairs Meeting of Academic Year 2021 (16 December 2021)
 Passed at the 3rd Curriculum Committee Organization of Department of Electrophysics (25 October 2022)
 Passed at the 1st Curriculum Committee Organization of College of Science (10 November 2022)
 Passed at the 2nd NYCU Curriculum Committee (28 November 2022)
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 Passed at the 8th Curriculum Committee Organization of Department of Electrophysics (10 March 2023)
 Passed at the Curriculum Committee Organization of College of Science (19 April 2023)
 Passed at the 3rd NYCU Curriculum Committee (16 May 2023)
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 Passed at the Curriculum Committee Organization of College of Science (16 April 2024)
 Passed at the 3rd NYCU Curriculum Committee (20 May 2024)

- 一、 依據國立陽明交通大學跨域學程實施辦法，國立陽明交通大學電子物理學系（下稱本系）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 Department of Electrophysics (hereinafter referred to as Our Department) 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 expanding 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 (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、 本系設置「電子物理」跨域學程，同時，本系與光電工程學系以及材料工程學系共同設置「三一學程」跨域學程，此兩個跨域學程的修業規定分別規範於第四條。

Article Three Our Department launches two cross-disciplinary programs. One is “Electrophysics” cross-disciplinary program, and the other is “Three-in-one” cross-disciplinary program formed by Our Department, Department of Photonics, and Department of Material Engineering. The guidelines of the two cross-disciplinary programs are given in Article Four.

四、 本要點修業規定

Article Four Policies of these Guidelines

1. 本系學生欲修習跨域學程者

1. For the student of our department who would like to take cross-disciplinary program

(1) 得於每學年度公告申請期限內向本系提出申請，申請時註明欲申請的第二專長系所或學院，本系將於學期中公告須準備的審查資料、當學年度開放給本系學生修讀跨域學程的名額及申請期限等資訊，申請案經本系教學輔導委員會審查通過後，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 should be submitted to our department within the dates of annual announcements by faculty. The department or college of the second specialty that students would like to apply for must be remarked on the application form, and the application deadline would be announced one month in advance by the Curricular Committee at our department. The 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 will be released on the announcement. The application should be sent to the department or the college of the second specialty for evaluation after it is approved by the Curricular Committee at our department. Students could take the cross-disciplinary program after passing evaluation by both sides.

(2) 學生修習跨域學程的課程，列示於「**電子物理系 跨域學程 本系學生必修科目表(A)**」，其課程包含：校必修(含共同必修24學分)、本系基礎必修課程、本系跨域模組課程、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 taken by students in our department should be listed on “The Required Course List for the students at our department study cross-disciplinary program in department of Electrophysics (A)”. The courses include required courses of the university (including 24 credits of general education subjects), core curriculum at our department, cross-disciplinary module curriculum at our department, 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 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，改修習本系的學士學位課程。
 - (3) For students at our department who study cross-disciplinary program but are not able to complete the program, they shall give up the cross-disciplinary program and take credits of bachelor degree program at their original department, Electrophysics.
2. 外系學生欲選擇本系「電子物理」跨域學程做為其跨域專長者
 2. For students from other departments who would like to take “Electrophysics” cross-disciplinary program as their cross-disciplinary specialty.
 - (1) 得於每學年度公告申請期限內向其所屬學系（以下簡稱原系）提出申請，通過原系以及本系的雙邊審查後，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, and they could take the cross-disciplinary program after approved by both their original department and our department.
 - (2) 外系學生修讀跨域學程且選擇本系做為其跨域專長者，其課程包含：校必修(含共同必修24學分)、原系基礎必修課程、原系跨域模組課程、以及列示於「**電子物理系 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「**電子物理**」為其跨域專長。
 - (2) The courses for the students from other departments who would like to study cross-disciplinary program and choose our department 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 department of Electrophysics (B)” with at least 128 graduate credits. The “Electrophysics” will be remarked as their cross-disciplinary specialty after the title of their original department on the diploma.
3. 本系或外系學生欲選擇三一學程做為其跨域專長者
 3. For students who would like to take “Three-in-one” cross-disciplinary program as their cross-disciplinary specialty.
 - (1) 得於每學年度公告申請期限內向其所屬學系（以下簡稱原系）提出申請，通過原系以及三一學程系群的雙邊審查後，方可進入跨域學程。

- (1) They could submit the application to the department that they belong to within the date announced every year; they could take the cross-disciplinary program after approved by both their original department and the committee of “Three-in-one” program.
- (2) 學生修讀跨域學程且選擇本學程做為其跨域專長者，其課程包含：校必修(含共同必修24學分)、原系基礎必修課程、原系跨域模組課程、以及列示於「三一學程(電子物理系，光電工程學系，材料工程學系)跨域模組課程必修科目表(C)」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「三一學程(電子物理/光電/材料)」為其跨域專長。
- (2) The courses for the students who would like to study cross-disciplinary program and choose “Three-in-one” program 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 “Three-in-one” program (C)” with at least 128 graduate credits. The “Three-in-one (Electrophysics/Photonics/Material)” will be remarked as their cross-disciplinary specialty after the title of their original department on the diploma.

五、 本系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 Five Our department assigns one full-time teacher to be the mentor of the cross-disciplinary program and forms a mentor group with teachers of cross-disciplinary program at other departments or colleges to give guidance to cross-disciplinary program students.

六、 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。

Article Six 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 according to National Yang Ming Chiao Tung University Principles for Verifying and Calculating Teachers' Teaching Hours.

七、 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 Seven If there is any unaccomplished matter of these guidelines, it shall be handled in accordance with the school constitution of our university as well as other relevant regulations.

八、 本實施要點由本系教學輔導委員會議訂定，經系務會議通過，依序經各級課程委員會審查通過後實施，修訂時亦同。

Article Eight These guidelines were amended by the Curriculum Committee of our department and approved by Department Affairs Meeting of our department, the Curriculum Committee Organization of College of Science, the Curriculum Committee Organization of NYCU, before putting it into practice. Any revision to this regulation shall follow the same procedures.

電子物理系跨域學程 本系學生 必修科目表 (A)

The Required Course List for the students at our department study cross-disciplinary program in department of Electrophysics (A)

類別 Category	科目名稱 Course Name	學分 Credits	開課系所 Department	備註 Remark
本系基礎必修 (39 學分) Core curriculum at our department (39 credits)	物理(一)(二) Physics(I)(II)	10	本系 Our department	
	物理實驗(一)(二) Physics Labs. (I)(II)			
	微積分(一)(二) Calculus(I)(II)	8	應用數學系 Department of Applied Mathematics	
	化學(一)(二) Chemistry(I)(II)	4	應用化學系 Department of Applied Chemistry 生物科技學系 Department of Biological Science and Technology	
	普通生物學(一)(二) General Biology(I)(II)			
	化學實驗(一)(二) Chemistry Labs. (I)(II)			
	普通生物學實驗(一)(二) General Biology Lab.(I)(II)			
	計算機概論(一) Introduction to Computer Science (I)	3	本系 Our department	
	應用數學(一)(二) Applied Mathematics(I)(II)	6		
	電子學實驗(一)(二) Electronics Labs. (I)(II)	4		
實驗物理(一)(二) Experimental Physics (I)(II)	4			
本系跨域模組 (28 學分) Cross-disciplinary modules at our department (28 credits)	電子物理組： Program of Electrophysics： 電子學(一)(二) Electronics (I) (II) 電磁學(一)(二) Electromagnetics (I) (II) 理論力學(一) Theoretical Mechanics(I) 近代物理(一) Modern Physics(I) 近代物理(二) Modern Physics (II) 熱物理 Thermal Physics 固態物理(一) Solid State Physics(I) 專題演講 Colloquium	28	本系 Our department	

	光電與奈米科學組： Program of Photonics and Nano-Sciences： 電子學(一)(二) Electronics (I) (II) 電磁學(一)(二) Electromagnetics (I) (II) 理論力學(一) Theoretical Mechanics(I) 近代物理(一) Modern Physics(I) 近代物理(二) Modern Physics (II) 熱物理 Thermal Physics 光學概論(一) Introduction to Optics (I) 專題演講 Colloquium		本系 Our department	
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 choose one to complete the cross- disciplinary modules offered by departments or colleges at our university.	28		
	合計 Total		校必修 (含共同必修 24 學分，至 多採計 40 學分) [註 1] Required courses of the university (including 24 credits of general courses and maximum 40 credits could be countable) [see Note 1]	
	最低畢業學分 Minimum Graduate Credits	128		

註 1：本校共同必修科目表規定，如大學部學生修習共同必修學分數超過 24 學分以上，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 take general education courses more than 24 credits, Maximum 40 general course credits can be counted as the graduate credits; please follow the regulations from each department if it is specially defined.

電子物理系 跨域模組課程 必修科目表 (B)

The Required Course List for the students study cross-disciplinary module curriculum in department of Electrophysics (B)

類別 Category	科目名稱 Course Name	學分 Credits	開課系所 Department	備註 Remark
本系跨域模組 (28 學分) Cross-disciplinary modules at our department (28 credits)	電磁學(一) Electromagnetics (I) 近代物理(一) Modern Physics (I) 電子學(一) Electronics (I)	9	本系 Our department	必修 Required courses
修畢於畢業證書 加註「跨域專 長：電子物理」 It could be remarked as “Cross- Disciplinary Specialty: Electrophysics” on the diploma after the module curriculum is completed.	電磁學(二) Electromagnetics (II) 電子學(二) Electronics (II) 理論力學(一)(二) Theoretical Mechanics (I) (II) 量子力學導論 Int. to Quantum Mechanics 近代物理(二) Modern Physics (II) 熱物理 Thermal Physics 固態物理(一)(二) Solid State Physics (I) (II) 材料科學導論 ¹ Int. to Materials Science ¹ 奈米科學導論 Int. to Nano Science 光學概論(一) Introduction to Optics (I) 專題演講 Colloquium	19	本系 Our department	選修 (不含原系之 必修學分) Elective courses (Excluding compulsory courses of the original department) ¹ [材料科學與工 程導論] 等同 於[材料科學導 論] ¹ [Introduction to Materials Science and Engineering] is the same as [Int. to Materials Science]
	總學分 Total credits	28		

三一學程（電子物理學系，光電工程學系，材料工程學系）

跨域模組課程 必修科目表 (C)

The Required Course List for the students study cross-disciplinary module curriculum in “Three-in-one (Electrophysics/Photonics/Material)” program (C)

類別 Category	科目名稱 Course Name	學分 Credit	開課系所 Department	備註 Remark	
三一學程跨域模組 (28 學分) Cross-disciplinary modules in Three- in-one program (28 credits) 修畢於畢業證書加 註「跨域專長： 三一學程(電子物 理/光電/材料)」 It could be remarked as “Cross- Disciplinary Specialty: Three- in-one (Electrophysics/ Photonics/Material) ” on the diploma after the module curriculum is completed.	模組一：理論與計算物理 Module 1: Theoretical and Computational Physics				
	近代物理(一) Modern Physics (I)	3	電物 Electrophysics		
	量子力學導論 Int. to Quantum Mechanics	3			
	計算物理 Computational Physics	3			
	模組二：半導體及量子科技 Module 2: Semiconductor and Quantum technology			電物 Electrophysics	¹ 電物系[半導體物理及元件]和光電系[半導體元件及物理]請擇一修習 ¹ To avoid overlap, please only choose one from the following two courses: [Semiconductor Physics and Devices] (Electrophysics) or [Semiconductor Devices and Physics] (Photonics)
	近代物理(一) Modern Physics (I)	3			
	半導體物理及元件 ¹ Semiconductor Physics and Devices	3			
	固態物理(一) Solid State Physics (I)	3			
	模組三：雷射與光電科 Module 3: Laser and Optoelectronics technology			電物 Electrophysics	
	電子實驗 Electronics Labs.	2			
	電磁學(一) Electromagnetics (I)	3			
	光學概論(一) Introduction to Optics (I)	3			
	雷射導論 Introduction to Laser	3			
	實驗物理 Experimental Physics	2			
	模組四：智慧光源 Module 4: Smart Light Source			光電 Photonics	² 修電物系[近代物理(一)]等同於光電系[近代物理] ² [Modern Physics] (Photonics) is the same as [Modern Physics (I)] (Electrophysics)
	光子學(一) Elements of Photonics (I)	3			
近代物理 ² Modern Physics	3				
材料光學 Optical Properties of Materials	3				
智慧光源科技與半導體實作 ³ Smart light source technology	3				

<p>模組五：光設計與光調變 Module 5: Light Design and Modulation</p> <p>光子學(一) Elements of Photonics (I)</p> <p>光學設計與像差理論 Optical design and aberration</p> <p>富氏光學 Fourier Optics</p> <p>矽基液晶光學系統設計與實作 Optical Laboratory Based on Liquid Crystal on Silicon</p>	<p>3</p> <p>3</p> <p>3</p> <p>3</p>	<p>光電 Photonics</p>	
<p>模組六：感測與顯示 Module 6: Sensing and Display</p> <p>半導體元件及物理¹ Semiconductor Devices & Physics¹</p> <p>顯示電子電路 Electronic Circuits for Display</p> <p>新穎半導體電晶體與感測器 New Semiconductor Transistors and Sensors</p>	<p>3</p> <p>3</p> <p>3</p>	<p>光電 Photonics</p>	<p>¹ 電物系[半導體物理及元件]和光電系[半導體元件及物理]請擇一修習</p> <p>¹ To avoid overlap, please only choose one from the following two courses: [Semiconductor Physics and Devices] (Electrophysics) or [Semiconductor Devices and Physics] (Photonics)</p>
<p>模組七：材料結構與鑑定 Module 7: Structure Characterization of Materials</p> <p>材料科學與工程導論 (一) Introduction to Materials Science and Engineering (I)</p> <p>晶體結構與繞射導論 Introduction to Crystallography and Diffraction</p> <p>材料微觀結構分析 Microstructural Characterization of Materials</p>	<p>3</p> <p>3</p> <p>3</p>	<p>材料 Material</p>	
<p>模組八：材料製造 Module 8: Fabrication of Materials</p> <p>材料工程實驗(一) Advanced Materials Labs. (I)</p> <p>材料基礎實驗(一) Elementary Materials Labs. (I)</p> <p>材料基礎實驗(二) Elementary Materials Labs. (II)</p> <p>半導體製程 Semiconductor Processing</p>	<p>2</p> <p>2</p> <p>2</p> <p>3</p>	<p>材料 Material</p>	
<p>模組九：材料特性 Module 9: Properties of Materials</p> <p>材料機械性質 Mechanical Behavior of Metals</p>	<p>3</p>	<p>材料 Material</p>	

材料物理性質 Physical Properties of Materials	3		
電子材料 Electronic Materials	3		
模組十：生醫工程 Module 10: Biomedical Engineering			
智慧生醫概論 Introduction of Smart Biomedicine	3	電物 Electrophysics	
生醫光子學導論 Introduction to Biophotonics	3	光電 Photonics	
奈米生醫材料簡介 Introduction to Nano-Biomaterials	3	材料 Material	
總學分 Total Credits	28		

※ 修課條件：Requirements:

1. 必選學分(16-18 學分)：自選三個模組，此三個模組的每個模組需至少修畢兩門課程，共六門必選課程。

Required courses (16-18 credits): Choose 3 modules from the 10 ones to serve as the required modules. Take 2 courses in these 3 modules respectively.

2. 其餘學分可從十個模組的課程中自由選擇。

Optional courses: for the remaining credits, students can freely choose among the 10 modules.

3. 滿足上述條件並修滿 28 學分則完成此跨域學程。

The cross-disciplinary program is completed after acquiring total 28 credits and satisfying the two conditions above.