國立陽明交通大學材料科學與工程學系跨域學程實施要點

National Yang Ming Chiao Tung University Cross-disciplinary Program Implementation Guidelines for Department of Materials Science and Engineering

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一、 依據國立陽明交通大學跨域學程實施辦法，國立陽明交通大學材料科學與工程學系(以下簡稱本系)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，特訂定本要點。

Article 1 The guidelines are set up for Department of Materials Science and Engineering (hereinafter refer to as Our Department) of National Yang Ming Chiao Tung University in accordance with 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 studies, build the depth of cross-disciplinary studies, and assist students expanding second specialties.

二、 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學系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 2 The cross-disciplinary program here means the cross-disciplinary module curriculum proposed by departments, institutes or colleges of NYCU. 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 are from (hereinafter refer to the original department) as well as the cross-disciplinary program module curriculum from the second specialty department 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 3 Policies of these Guidelines:

（一）本系學生欲修習跨域學程者

1. 得於在學期間依公告申請時程向本系提出申請，申請時註明欲申請的第二專長學系或學院，申請期限將由本系課程委員會提前一個月進行公告，公告中說明需準備的審查資料以及當年度本系開放給本系學生修讀跨域學程的名額，申請案經本系課程委員會審查通過後，需送到第二專長學系或學院審查，通過雙邊審查後，方可進入跨域學程。
2. 本系學生修習跨域學程的課程，列示於「材料科學與工程學系跨域學程本系學生必修科目表」，其課程包含：校必修、本系基礎必修課程、本系跨域模組課程、以及第二專長學系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129學分為原則。他系跨域模組課程認定為跨域專長，於畢業證書本系名稱後加註此跨域專長。
3. 本系學生修習跨域學程，若無法修畢跨域學程課程，得選擇放棄跨域學程，改修習原學系的學士學位課程。

(1) Students in our department who would like to study for cross-disciplinary program

1. Students can submit their applications to the department or the college of the second specialty they would like to apply in the 2nd semester of academic year. Application deadline shall be announced along with materials required for verification and available numbers for students from our department of that year one month earlier by curriculum committee of our department. The application shall be submitted to the department or the college of the second specialty for review after being verified by curriculum committee of our department; students can enroll in the cross-disciplinary program once they pass both reviews.
2. Curriculum of cross-disciplinary program for students from our department is listed in “Compulsory courses list of cross-disciplinary program for students from Department of Materials Science and Engineering”. The curriculum must include compulsory courses of the university, core curriculum of our department, cross-disciplinary program module curriculum of our department, and the cross-disciplinary program module curriculum of the second specialty department or the college (hereinafter refer to as cross-disciplinary program module curriculum of other departments). The graduate credit needed for this cross-disciplinary program is at the basis of 129 credits. The module curriculum of the cross-disciplinary program of other departments will be recognized as cross-disciplinary specialty and be remarked on the diploma after the name of students’ original department.
3. If the student from our department is not able to finish his/her cross-disciplinary program, he/she could give up this program and take credits of bachelor degree program at their original department instead.

（二）外系學生欲修習跨域學程且選擇本系做為其跨域專長者

(1) 得於在學期間依公告申請時程向其所屬學系（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。

(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、原系基礎必修課程、原系跨域模組課程、以及列示於「材料科學與工程學系跨域模組課程必修科目表」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「材料科學與工程」為其跨域專長。

(2) For students from other departments who would like to take "**Materials Science and Engineering**" cross-disciplinary program as their cross-disciplinary specialty.

1. Students can submit application to the department they are from (hereinafter refer to the original department) in the 2nd semester of academic year; students can enroll in the cross-disciplinary program after they pass both reviews of the original department and our department.
2. For students from other departments who would like to study for cross-disciplinary program and choose our department as his/her cross-disciplinary specialty, the curriculum must include compulsory courses at the university, core curriculum of the original department, cross-disciplinary module curriculum of their original department, and module curriculum listed in "Compulsory courses list of cross-disciplinary module curriculum for Department of Materials Science and Engineering". The graduate credit needed for this cross-disciplinary program is at the basis of 128 credits and Materials Science and Engineering could be remarked as "cross-disciplinary specialty" on the diploma after the name of students' original department.

（三）欲選擇三一學程做為其跨域專長者

(1) 得於在學期間依公告申請時程向其所屬學系（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。

(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、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」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。

(3) For student who would like to take "Three-in-one" cross-disciplinary program as their cross-disciplinary specialty.

1. They could submit the application to the department that they belong to during the second semester of the academic year, they could take the cross-disciplinary program after approved by both their original department and the committee of "Three-in-one" program.
2. The courses for the students who would like to study for cross-disciplinary program and choose "Three-in-one" program as their cross-disciplinary specialty include required courses of the university, 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" 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.

四、 本系指定一名專任教師擔任跨域學程導師，與外學系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 4 Our department assigns a full-time faculty member as the mentor of cross-disciplinary program and forms mentor groups with mentors from cross-disciplinary program of original departments or colleges to give guidance to the students at in this program.

五、 為鼓勵不同學系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 5 In order to encourage different departments or colleges working together for designing cross-disciplinary curriculum, teaching hours for the innovative cross-disciplinary 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.

六、 本要點如有未盡事宜，悉依本校學則及其他相關規定辦理。

Article 6 If there is any unaccomplished matter of the guideline, it shall be handled in accordance with the school constitution of our university as well as other relevant regulations.

七、 本要點經校級課程委員會通過後實施，修訂時亦同。

Article 7 These guidelines were approved by Curricular Committee at department, college and university level before putting it into practice; the same shall be done upon any amendment thereto.

材料科學與工程學系跨域學程 本系學生 必修科目表（A）

Cross-disciplinary Program for Students from Department of Materials Science and Engineering Compulsory Courses List (A)

類別 Category	科目名稱 Course		學分 Credit	開課學系 Department	備註 Remarks
本系基礎必修 （40 學分） Fundamental Compulsory Course of Our Department (40 credits)	化學(一)(二) General Chemistry (I) (II)		6	應化系 DAC	
	化學實驗(一)(二) General Chemistry Labs (I) (II)		2	應化系 DAC	
	物理(一)(二) General Physics (I) (II)		8	物理小組 Physics group	
	物理實驗(一)(二) General Physics Labs (I) (II)		2	物理小組 Physics group	
	微積分(一)(二) Calculus (I) (II)		8	微積分小組 Calculus group	
	工程數學(一)(二) Engineering Mathematics (I) (II)		6	材料系 MSE	
	材料基礎實驗(一) Elementary Materials Labs (I)		2	材料系 MSE	
	材料工程實驗(一)(二) Advanced Materials Labs (I) (II)		4	材料系 MSE	
	服務學習(一)(二) Campus Service (I) (II)		0	材料系 MSE	或一門「專業服務學習課程」 Or one professional Campus Service courses
	生涯規劃及導師時間(一)(二) Career Planning and Mentor's Hours (I) (II)		2	材料系 MSE	
本系跨域模組 （29-30 學分） （28-32 學分） [註 1] Cross-disciplinary Module of Our Department (29-30 credits) (28-32 credits) See Remark 1	必修	材料科學與工程導論(一)(二) Introduction of Materials Science and Engineering (I) (II)	6	材料系 MSE	
		材料熱力學(一)(二) Thermodynamics of Materials(I) (II)	6	材料系 MSE	
		晶體結構與繞射導論 Introduction of Crystallography and Diffraction	3	材料系 MSE	
	專業選修	物理冶金(一) Physical Metallurgy (I)	3	材料系 MSE	11 選 5 (專業選修及材料選修至少各 1 門) 5 courses out of 11 (select at least 1 course from elective professional and materials courses respectively)
		物理冶金(二) Physical Metallurgy (II)	3	材料系 MSE	
		材料基礎實驗(二) Elementary Materials Labs. (II)	2	材料系 MSE	
		材料機械性質 Mechanical Behaviors of Materials	3	材料系 MSE	
		材料動力學概論 Rate Processes in Materials	3	材料系 MSE	
		材料微觀結構分析 Microstructural Characterization of	3	材料系 MSE	

		Materials			
		材料力學 Mechanics of Materials	3	材料系 MSE	
	材料選修	金屬材料 Metal Materials	3	材料系 MSE	
		陶瓷材料 Ceramics Materials	3	材料系 MSE	
		電子材料 Electronics Materials	3	材料系 MSE	
		高分子材料科學 Polymer Materials Science	3	材料系 MSE	
他系跨域模組（28-32 學分） Cross-disciplinary Module of Other Departments (28-32 credits)	本校各系所或學院所提供之跨域模組學程，擇一修畢 Select one cross-disciplinary module program provided by any department or college in NYCU.		28		
合計 Total			129	校必修至多採計（40 學分）[註 2] Compulsory courses at the university (the approvable number of credits shall not exceed 40)	
最低畢業學分 Minimum Credits			129		

註 1：（A）表中之本系跨域模組＝（B）表

註 2：如大學部學生修習共同必修學分數超過本校規定最低應修學分數，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。

Remarks

1. The cross-disciplinary module of our department in list (A) is equivalent to list (B).
2. Maximum 40 general course credits can be counted as the graduate credits. However, the approval should follow the regulation of any other applicable related ones in each department.

材料科學與工程學系學系　跨域模組課程 必修科目表（B）

Cross-disciplinary Module Curriculum for Department of Materials Science and Engineering Compulsory Courses List (B)

類別 Category		科目名稱 Course	學分 Credit	開課學系 Department	備註 Remarks
本系跨域模組（29-30 學分）修畢於畢業證書加註「跨域專長：材料科學與工程」 Cross-disciplinary Module of Our Department (29-30 credits) "Cross-disciplinary specialty: **Materials Science and Engineering**" could be remarked on the diploma after completing courses	必修	材料科學與工程導論(一)(二) Introduction of Materials Science and Engineering (I) (II)	6	材料系 MSE	
		材料熱力學(一)(二) Thermodynamics of Materials(I) (II)	6	材料系 MSE	
		晶體結構與繞射導論 Introduction of Crystallography and Diffraction	3	材料系 MSE	
	專業選修	物理冶金(一) Physical Metallurgy (I)	3	材料系 MSE	11 選 5 (專業選修及材料選修至少各 1 門) 5 courses out of 11(select at least 1 course from elective professional and materials courses respectively)
		物理冶金(二) Physical Metallurgy (II)	3	材料系 MSE	
		材料基礎實驗(二) Elementary Materials Labs. (II)	2	材料系 MSE	
		材料機械性質 Mechanical Behaviors of Materials	3	材料系 MSE	
		材料動力學概論 Rate Processes in Materials	3	材料系 MSE	
		材料微觀結構分析 Microstructural Characterization of Materials	3	材料系 MSE	
		材料力學 Mechanics of Materials	3	材料系 MSE	
	材料選修	金屬材料 Metal Materials	3	材料系 MSE	
		陶瓷材料 Ceramics Materials	3	材料系 MSE	
		電子材料 Electronics Materials	3	材料系 MSE	
		高分子材料科學 Polymer Materials Science	3	材料系 MSE	
總學分 Total Credit			29-30		

三一學程（電子物理學系、光電工程學系、材料科學與工程學系）
跨域模組課程 必修科目表（C）

The Required Course List for students who study cross-disciplinary program and choose "Three-in-one (Electrophysics/Photonics/Material)" as their cross-disciplinary specialty
Compulsory Courses List (C)

類別 Category	科目名稱 Course	學分 Credit	開課學系 Department	備註 Remarks
三一學程 跨域模組 （28 學分） 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)」 Cross-disciplinary modules in Three-in-one program (28 credits) 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	電物 Electrophysics	
	計算物理 Computational Physics	3	電物 Electrophysics	
	模組二：半導體及量子科技 Module 2: Semiconductor and Quantum technology			[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 of the following two courses: [Semiconductor Physics and Devices] (Electrophysics) or [Semiconductor Devices and Physics] (Photonics)
	近代物理(一) Modern Physics (I)	3	電物 Electrophysics	
	半導體物理及元件 [1] Semiconductor Physics and Devices [1]	3	電物 Electrophysics	
	固態物理(一) Solid State Physics (I)	3	電物 Electrophysics	
	電子實驗 Electronics Labs.	3	電物 Electrophysics	
	模組三：雷射與光電科技 Module 3: Laser and Optoelectronics technology			
	電磁學(一) Electromagnetics (I)	3	電物 Electrophysics	
	光學概論(一) Introduction to Optics(I)	3	電物 Electrophysics	
	雷射導論 Introduction to Laser	3	電物 Electrophysics	
	實驗物理 Experimental Physics	2	電物 Electrophysics	
	模組四：智慧光源 Module 4: Smart Light Source			[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	光電 Photonics	
	近代物理 [2] Modern Physics [2]	3	光電 Photonics	
	材料光學 Optical Properties of Materials	3	光電 Photonics	
	智慧光源科技與半導體實作 Smart light source technology	3	光電 Photonics	
	模組五：光設計與光調變 Module 5: Light Design and Modulation			

	光子學(一) Elements of Photonics(I)	3	光電 Photonics	
	光學設計與像差理論 Design, fabrication, testing & measurement	3	光電 Photonics	
	富氏光學 Fourier Optics	3	光電 Photonics	
	矽基液晶光學系統設計與實作 Optical Laboratory Based on Liquid Crystal on Silicon	3	光電 Photonics	
	模組六：感測與顯示 Module 6: Sensing and Display			[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 of the following two courses: [Semiconductor Physics and Devices] (Electrophysics) or [Semiconductor Devices and Physics] (Photonics)
	半導體元件及物理 [1] Semiconductor Devices & Physics [1]	3	光電 Photonics	
	顯示電子電路 Electronic Circuits for Display	3	光電 Photonics	
	新穎半導體電晶體與感測器 New Semiconductor Transistors and Sensors	3	光電 Photonics	
	模組七：材料結構與鑑定 Module 7: Structure Characterization of Materials			
	材料科學與工程導論(一) Introduction to Materials Science and Engineering (I)	3	材料 Material	
	晶體結構與繞射導論 Introduction to Crystallography and Diffraction	3	材料 Material	
	材料微觀結構分析 Microstructural Characterization of Materials	3	材料 Material	
	模組八：材料製造 Module 8: Fabrication of Materials			
	材料工程實驗(一) Advanced Materials Labs.(I)	2	材料 Material	
	材料基礎實驗(一) Elementary Materials Labs.(I)	2	材料 Material	
	材料基礎實驗(二) Elementary Materials Labs.(II)	2	材料 Material	
	半導體製程 Semiconductor Processing	3	材料 Material	
	模組九：材料特性 Module 9: Properties of Materials			
	材料機械性質 Mechanical Behavior of Metal	3	材料 Material	
	材料物理性質 Physical Properties of Materials	3	材料 Material	
	電子材料 Electronic Materials	3	材料 Material	
	模組十：生醫工程 Moldue10: 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	3	光電	

	Biophotonics		Photonics	
	奈米生醫材料簡介 Introduction to Nano-Biomaterials	3	材料 Material	
總學分 Total		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.