元智大學電機工程學系（丙組）「半導體暨綠能」深耕跨域學程科目規劃表

Department of Electrical Engineering (Program C), Yuan Ze University

"Semiconductor and Green Energy" Advanced Cross-Domain Program Course Planning Table

（115學年度申請適用)

(For students applied in Academic Year 2026)

115.04.29 一一四學年度第七次教務會議通過

Passed by the 7th Academic Affairs Meeting, Academic Year 2025, on April 29, 2026

一、教學目標 Teaching Objectives：

隨著科技蓬勃發展，半導體技術的突破已成為推動現代電子元件創新應用的核心，並廣泛支撐民生消費與工業應用的龐大需求。同時，全球高度依賴化石燃料的經濟模式導致溫室氣體與細懸浮微粒急遽增加，引發嚴峻的氣候變遷與生態危機。因此，深化半導體前瞻技術並加速綠色替代能源的開發，已成為當前全球工程領域最具指標性的發展趨勢與永續挑戰。因應此產業趨勢，本學程旨在培育兼具半導體科技與綠能應用之跨領域專業工程人才。

現代半導體技術涵蓋無機與有機固態材料，憑藉其相異特性，在各式先進電子與能源轉換系統中發揮關鍵作用；而綠色能源的發展亦與半導體材料技術息息相關，尤以具備永續特性的潔淨能源為核心。為此，本學程之核心課程向下扎根學生的固態科學與半導體物理基礎，並結合先進元件之製程技術，強化實務製造能力。在綠能發電與高效節能技術方面，則著重探討潔淨能源的獲取機制與低耗能元件的設計，使學生具備扎實的專業知識與產業對接能力。

為進一步拓寬學生的專業視野，學程提供豐富且具彈性的專業選修規劃。專業領域涵蓋前瞻半導體材料、固態元件物理、先進光子學及節能技術，以深化學生的次領域專長；同時納入積體電路設計、工程實驗分析與新能源技術等跨系所專業訓練，落實跨域整合。透過此系統化之課程設計，期能全面建構學生在半導體與綠能產業鏈中，涵蓋上游材料研發與物理機制、中游元件設計與製程整合，乃至下游積體電路與系統應用之關鍵技術能力，以契合國家高科技產業發展與全球永續科技之高階人才需求。

With rapid technological advancements, breakthroughs in semiconductor technology have become the core driver for innovative applications in modern electronic devices, extensively supporting massive consumer and industrial demands. Meanwhile, the global economy's heavy reliance on fossil fuels has led to a sharp increase in greenhouse gases and fine particulate matter, triggering severe climate change and ecological crises. Therefore, advancing cutting-edge semiconductor technologies and accelerating the development of green alternative energy have become the most prominent trends and sustainability challenges in the global engineering field today. In response to these industry trends, this program aims to cultivate interdisciplinary engineering professionals with expertise in both semiconductor technology and green energy applications.

Modern semiconductor technologies encompass both inorganic and organic solid-state materials, which, based on their distinct properties, play crucial roles in various advanced electronic and energy-conversion systems. Furthermore, the development of green energy is closely related to semiconductor material technologies, with sustainable clean energy at its core. To address this, the program's core curriculum establishes a solid foundation in solid-state science and semiconductor physics, integrated with advanced device manufacturing technologies to strengthen practical capabilities. Regarding green power generation and high-efficiency energy-saving technologies, the focus is on exploring clean energy harvesting mechanisms and low-power device design, equipping students with robust professional knowledge and industry alignment.

To further broaden students' professional perspectives, the program offers flexible and diverse advanced elective modules. These cover fields such as advanced semiconductor materials, solid-state device physics, advanced photonics, and energy-saving technologies, deepening students' sub-field expertise. Simultaneously, cross-departmental training in integrated circuit design, engineering experimental analysis, and new energy technologies is incorporated to implement cross-domain integration. Through this systematic curriculum design, the program aims to comprehensively build students' critical technical competencies across the semiconductor and green energy supply chains—spanning upstream material research and physical mechanisms, midstream device design and process integration, and downstream integrated circuits and system applications—to meet the high-level talent demands of national high-tech industries and global sustainable technologies.

二、課程設計 **Curriculum Design**:

必修課程：至少 12 學分

Required Courses: At least 12 credits

課號 Course ID	課程名稱 Course Name	學分 Credit(s)	學制 Degree structure	開課系所 Department Offered the Present Course(s)	備註 Remarks
EEC331	半導體物理導論 Introduction to Semiconductor Physics	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	二選一 Choose one of the two options
EEC503	半導體物理 Semiconductor Physics	3	碩士班 Master Program		
EEC542	半導體製程技術導論 Introduction to Semiconductor Manufacturing Technology	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	二選一 Choose one of the two options
EEC407	光電元件製程 Manufacturing Technology of Optoelectronic Devices	3	學士班 Undergraduate Program		
EEC540	發光二極體原理與應用 Principles and Applications of Light Emitting Diodes	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	三選一 Choose one of the three options
EEC541	太陽能光電元件 Photovoltaic Devices	3	碩士班 Master Program		
EEC402	太陽能源導論 Introduction to Solar Energy	3	學士班 Undergraduate Program		
EEC305	近代物理（一） Modern Physics(I)	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	

選修課程（組內）：至少 3 學分

Elective courses within program C : at least 3 credits

課號 Course ID	課程名稱 Course Name	學分 Credit(s)	學制 Degree structure	開課系所 Department Offered the Present Course(s)	備註 Remarks
EEC311	液晶顯示器之基礎原理 Fundamentals of Liquid Crystal Display	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC417	有機光電半導體導論 Introduction of organic semiconductor for optoelectronics	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	二選一 Choose one of the two options
EEC543	有機發光元件及物理 Organic light-emitting devices and physics	3	碩士班 Master Program		
EEC531	半導體元件 Semiconductor Devices	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	二選一 Choose one of the two options
EEC307	半導體元件物理 Semiconductor Device Physics	3	學士班 Undergraduate Program		
EEC509	固態物理 Solid-State Physics	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	二選一 Choose one of the two options
EEC408	固態物理導論 Introduction to Solid-state Physics	3	學士班 Undergraduate Program		
EEC403	新興顯示科技導論 Introduction to Emerging Display Technologies	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC419	節能照明 Green Lighting	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC519	液晶顯示光學 Optics of Liquid Crystal Displays	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC551	薄膜工程 Thin-film Technology	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	

課號 Course ID	課程名稱 Course Name	學分 Credit(s)	學制 Degree structure	開課系所 Department Offered the Present Course(s)	備註 Remarks
EEC414	色度學 Colorimetry	3	學士班 Undergraduate Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC549	前瞻光電元件導論 Introduction of the advanced optoelectronic devices	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC546	矽光子學導論 An Introduction to Silicon Photonics	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	
EEC564	光電積體電路 Electrooptical Integrated Circuits	3	碩士班 Master Program	電機系(丙組) Department of Electrical Engineering (Program C)	

選修課程（組外）：至少 3 學分

Elective courses outside program C : at least 3 credits

課號 Course ID	課程名稱 Course Name	學分 Credit(s)	學制 Degree structure	開課系所 Department Offered the Present Course(s)	備註 Remarks
EEA350	超大型積體電路設計導論 Introduction to VLSI	3	學士班 Undergraduate Program	電機系(甲組) Department of Electrical Engineering (Program A)	五選一 Choose one of the five options
EI309	超大型積體電路設計導論 Introduction to VLSI	3	學士班 Undergraduate Program	電通學院英語學士班 International Bachelor Program in Electrical and Communication Engineering	
CS378	超大型積體電路設計導論 Introduction to VLSI Design	3	學士班 Undergraduate Program	資工系 Department of Computer Science and Engineering	
CS658	超大型積體電路設計 VLSI Design	3	碩士班 Master Program	資工系 Department of Computer Science and Engineering	
CS668	超大型積體電路測試與設計 VLSI Testing & Design	3	碩士班 Master Program	資工系 Department of Computer Science and Engineering	
EI332	半導體元件模擬實驗 Semiconductor Device Simulation Lab.	3	學士班 Undergraduate Program	電通學院英語學士班 International Bachelor Program in Electrical and Communication Engineering	
DE204	實驗設計 Experimental Design	3	學士班 Undergraduate Program	工程學院英語學士班 International Bachelor Program in Engineering	三選一 Choose one of the two options
IE538	實驗設計 Experimental Design and Applications	3	碩士班 Master Program	工管系 Department of Industrial Engineering and Management	
CH511	實驗設計 Design for Experimental	3	碩士班 Master Program	化材系 Department of Chemical Engineering and Materials Science	
CH348	儀器分析 Instrumental Analysis	3	學士班 Undergraduate Program	化材系 Department of Chemical Engineering and Materials Science	
ME483	燃料電池概論 Introduction to Fuel Cell Technology	3	學士班 Undergraduate Program	機械系 Department of Mechanical Engineering	

三、學程證書授予標準Certificate Award Criteria：

1. 本組學生須修畢必修課程 12 學分、組內選修課程至少 3 學分，以及組外選修課程至少 3 學分。總計修滿 18 學分（含）以上者，將授予「半導體暨綠能」深耕跨域學程證書。

   Students in Program C of the Department of Electrical Engineering must complete a minimum of 18 credits, which include 12 credits of required courses, at least 3 credits of elective courses within

the program, and at least 3 credits of elective courses from outside the program. Upon successful completion of these requirements, students will be awarded Certificate of the “Semiconductor and Green Energy” Advanced Cross-Domain Program.

2. 須至少修習一門非學生所屬學系（組、班）之科目（不可包含與他系合開之課程）
Students are required to take at least one course outside their own department (or program/class). (The courses co-offered with other departments are not included.)

四、領域別 Fields of Study：

半導體 Semiconductors

五、學程召集人 Program Director：

劉維昇 教授 Prof. Wei-Sheng Liu

六、負責規劃單位 Responsible Planning Unit：

電機工程學系(丙組) Department of Electrical Engineering (Program C)