

前瞻半導體研究所碩士班

甲組課程：奈米元件與製程（簡稱：元件組）

114 學年度

修業年限	1 年至 4 年為限。
應修學分數	24 學分(含主修組別核心課程至少 6 學分，及專業選修課程至少 12 學分) *核心課程應先滿足 6 學分規定，超過之核心課程學分可列計專業選修學分。
應 修(應選)課程及符合畢業資格之修課相關規定	<p>一、論文研討應加總通過 2 學期，但論文研討不計入應修學分數 24 學分。論文研討課程可用本學院產學研究課程(業師課程或企業實習)申請免修，同意免修之產學研究課程不得計入應修學分數 24 學分。</p> <p>二、學術研究倫理教育課程為必修教育課程，採網路教學方式，課程總測驗成績應達及格標準，但不計入應修學分數 24 學分。</p> <p>三、專業核心課程 以下專業核心課程，若為「本所開設課程」或「本所專任老師開設課程」，應優先修習方可認列為核心課程學分。若為第二次重修則不在此限。</p> <ol style="list-style-type: none"> 1. 固態物理 2. 量子力學* 3. 半導體物理及元件 4. 積體電路技術(一) 5. 複合物半導體元件與製程 6. 電子材料 7. 半導體元件物理與奈米電晶體 <p>*量子力學(一)等同該科目</p> <p>四、專業選修課程 由本所或本所專任老師開設的相關領域具代表性的推薦科目列示如下</p> <ol style="list-style-type: none"> 1. 先進奈米電子和自旋電子元件簡介 2. 先進元件製造技術導論(一) 3. 先進元件製造技術導論(二) 4. 積體電路技術(二) 5. 半導體感測器 6. 先進堆疊式奈米結構製作 7. 記憶體元件與製程 8. 前瞻 CMOS 製程整合工程 9. 半導體構裝和異質整合技術 <p>相關領域具代表性的推薦科目列示如下，具體開課狀況請查詢當學期課表</p> <ol style="list-style-type: none"> 1 矽奈米元件及物理 2 半導體物理及元件(二) 3 More Than Moore 元件 4 半導體元件可靠度及其失效物理 5 碳化矽製程技術

- 6 二維半導體概論
- 7 元件設計與模擬實驗
- 8 元件電路計測實驗
- 9 半導體實驗
- 10 材料機械性質
- 11 CMOS 元件, 可靠度, 及應用之特論
- 12 積體電路之靜電防護設計特論
- 13 本校產學創新研究學院、電機學院、資訊學院、國際半導體學院、工學院和理學院專業研究所課程, 且需指導教授同意, 方可認列專業選修學分

六、若課名、課綱超過三成相同時視為修習重複課程。僅擇一認列畢業學分。

七、未盡事宜以本所通過之修業規章為準。

Institute of Pioneer Semiconductor Innovation
 MS Program
 Area A-Nanodevice and Process Group
 (Abbreviated as: Device Group)
 Academic Year 2025

Duration of Study	One to Four years
Minimum Credits Required	24 Credits (including at least 6 credits of core courses and 12 credits of required elective courses)
Curriculum and Regulations	<p>I. Students are required to complete thesis seminars over two semesters. However, these seminars shall not be counted toward the required 24 academic credits for graduation. Students may apply for a waiver of the thesis seminar requirement by completing industry-academia research courses offered by the college (including courses taught by industry professionals or corporate internships). Courses approved for such a waiver shall not be counted toward the required 24 academic credits..</p> <p>II. Students are required to take and pass the online course of Academic and Research Ethics by the end of the first semester of their enrollment. This will not be counted for the required credits for graduation.</p> <p>III. Core Courses (Select a minimum of 2 courses from the list below.) The following core courses, if offered by the institute or taught by full-time faculty members of the institute, must be taken as a priority in order to be counted as core course credits. This requirement does not apply to second retakes.</p> <ol style="list-style-type: none"> 1. Solid State Physics 2. Quantum Mechanics* 3. Semiconductor Physics and Devices 4. Integrated Circuit Technology 5. Intro. to Compound Semiconductor Device & Process 6. Electronic Materials 7. Semiconductor Device Physics and Nanoscale Transistors <p>*Quantum Mechanics (I) is equivalent to this subject</p> <p>IV. Required Elective Course (Select a minimum of 4 courses from the list below.) Representative recommended subjects in relevant fields offered by the institute or taught by full-time faculty members of the institute are listed as follows:</p> <ol style="list-style-type: none"> 1. Introduction to Emerging Devices from Nanoelectronics and Spintronics 2. Introduction to advanced device fabrication technology (I) 3. Introduction to advanced device fabrication technology (II) 4. Integrated Circuit Technology (II) 5. Semiconductor Sensors 6. Fabrication of advanced stacked nanostructure 7. Memory Device and Process Technology 8. Advanced CMOS Process Integration Engineering 9. Semiconductor packaging and Heterogeneous Integration Technology <p>Representative recommended subjects in the relevant fields are listed as follows. Please refer to the current semester's course schedule for specific course offerings.</p> <ol style="list-style-type: none"> 1. Silicon Nanometer Devices and Physics 2. Semiconductor Physics and Devices (II) 3. More Than Moore Devices 4. Reliability and Failure Physics of Semiconductor Devices

5. SiC Process Technology
6. Introduction to 2D Semiconductors
7. Device Design and Simulation Lab
8. Device and Circuit Characterization Laboratory
9. Semiconductor Laboratory
10. Mechanical Behaviors of Materials
11. Special Topics of CMOS Devices, Reliability, and Applications
12. Special topic on ESD Protection Design in CMOS Ics
13. Professional courses offered by the Industry Academia Innovation School, College of Electrical and Computer Engineering, College of Computer Science, the International College of Semiconductor Technology, the College of Engineering, and the College of Science institutes require the approval of the supervising professor for recognition of professional elective credits.

V. If the course title and syllabus overlap by more than 30%, the courses will be considered duplicates, and only one of them may be counted toward the graduation credit requirement.

VI. For additional details, refer to the “Master’s Program Academic Regulations” of the Institute of Pioneer Semiconductor Innovation

前瞻半導體研究所碩士班

乙組課程：晶片設計與自動化（簡稱：晶片組）

114 學年度

修業年限	1 年至 4 年為限。
應修學分數	24 學分(含主修組別核心課程至少 6 學分，及專業選修課程至少 12 學分) *核心課程應先滿足 6 學分規定，超過之核心課程學分可列計專業選修學分。
應修(應選)課程及符合畢業資格之修課相關規定	<p>一、論文研討或應加總通過 2 學期，但論文研討不計入應修學分數 24 學分。論文研討課程可用本學院產學研究課程(業師課程或企業實習)申請免修，同意免修之產學研究課程不得計入應修學分數 24 學分。</p> <p>二、學術研究倫理教育課程為必修教育課程，採網路教學方式，課程總測驗成績應達及格標準，但不計入應修學分數 24 學分。</p> <p>三、專業核心課程 以下專業核心課程，若為「本所開設課程」或「本所專任老師開設課程」，應優先修習方可認列為核心課程學分。若為第二次重修則不在此限</p> <ol style="list-style-type: none"> 1. 數位積體電路 2. 計算機結構 3. 記憶體電路及系統設計 4. 類比積體電路 5. 功率積體電路設計 6. 射頻積體電路 7. 高等演算法(或演算法) 8. 計算機輔助設計特論 9. 實體設計自動化 <p>四、專業選修課程 由本所或本所專任老師開設的相關領域具代表性的推薦科目列示如下</p> <ol style="list-style-type: none"> 1. 進階電子設計自動化 2. 射頻通訊系統放大器設計概論 <p>相關領域具代表性的推薦科目列示如下，具體開課狀況請查詢當學期課表</p> <ol style="list-style-type: none"> 1. 數位通訊積體電路 2. 數位信號處理超大型積體電路 3. 積體電路設計實驗 4. 資料轉換積體電路 5. 高等數位訊號處理 6. 深度學習 7. VLSI 測試與可測試性設計 8. 機器學習智能晶片設計 9. 圖形理論 10. 電源管理晶片設計與實作 11. 積體電路之靜電防護設計特論 12. 影像處理 13. 隨機過程

14. 本校產學創新研究學院、電機學院、資訊學院、國際半導體學院、工學院和理學院專業研究所課程，且需指導教授同意，方可認列專業選修學分。

五、若課名、課綱超過三成相同時視為修習重複課程。僅擇一認列畢業學分

六、未盡事宜以本所通過之修業規章為準。

Institute of Pioneer Semiconductor Innovation
 MS Program
 Area B-Chip Design and Automation Group
 (Abbreviated as: Chip Group)

Academic Year 2025

Duration of Study	One to Four years
Minimum Credits Required	24 Credits (including at least 6 credits of core courses and 12 credits of required elective courses)
Curriculum and Regulations	<p>I. Students are required to complete thesis seminars over two semesters. However, these seminars shall not be counted toward the required 24 academic credits for graduation. The thesis seminar (book report discussion) course can also be substituted with the college's industry-academic research courses (such as industry mentor courses or corporate internships), but even after the substitution, the industry-academic research courses will not be counted towards the required 24 credits.</p> <p>II. Students are required to take and pass the online course of Academic and Research Ethics by the end of the first semester of their enrollment. This will not be counted for the required credits for graduation.</p> <p>III. Core Courses (Select a minimum of 2 courses from the list below.) The following core courses, if offered by the institute or taught by full-time faculty members of the institute, must be taken as a priority in order to be counted as core course credits. This requirement does not apply to second retakes.</p> <ol style="list-style-type: none"> 1. Digital Integrated Circuits 2. Computer Architecture 3. Memory Circuits and System 4. Analog Integrated Circuits (Design) 5. Power Integrated Circuits Design 6. Radio-Frequency Integrated Circuits (Design) 7. Advanced Algorithm(or Algorithms) 8. Special Topics in Computer Aided Design 9. Physical Design Automation <p>IV. Required Elective Course (Select a minimum of 4 courses from the list below.) Representative recommended subjects in relevant fields offered by the institute or taught by full-time faculty members of the institute are listed as follows:</p> <ol style="list-style-type: none"> 1. Advanced EDA Topics 2. Introduction to Amplifier Design for Radio-Frequency Communication Applications <p>Representative recommended subjects in the relevant fields are listed as follows. Please refer to the current semester's course schedule for specific course offerings.</p> <ol style="list-style-type: none"> 1. Digital Communication Integrated Circuits 2. VLSI Digital Signal Processing 3. Integrated Circuit Design Laboratory 4. Data Conversion Integrated Circuits 5. Advanced Digital Signal Processing 6. Deep Learning 7. VLSI Testing and Design for Testability 8. Machine Learning Intelligent Chip Design 9. Graph Theory 10. Power Management Integrated Circuit Design and Implementation

11. Special topic on ESD Protection Design in CMOS Ics
12. Introduction to Image Processing
13. Stochastic Processes
14. Professional courses offered by the Industry Academia Innovation School, College of Electrical and Computer Engineering, College of Computer Science, the International College of Semiconductor Technology, the College of Engineering, and the College of Science institutes require the approval of the supervising professor for recognition of professional elective credits.

V. If the course title and syllabus overlap by more than 30%, the courses will be considered duplicates, and only one of them may be counted toward the graduation credit requirement.

VI. For additional details, refer to the “Master’s Program Academic Regulations” of the Institute of Pioneer Semiconductor Innovation.

前膽半導體研究所博士班

114 學年度

修業年限	2 年至 7 年為限。
應修學分數	18 學分(含本所核心課程至少 6 學分，及本所專業選修課程至少 6 學分) *核心課程應先滿足 6 學分規定，超過之核心課程學分可列計專業選修學分。
逕博應修學分數	逕行修讀博士班學位研究生(簡稱逕博生)至少 24 學分。(不包含論文研討及學位論文研究)
應修(應選)課程及符合畢業資格之修課相關規定	<p>一. 論文研討課程應加總通過 2 學期，但不計入 18 學分中。論文研討課程可用本學院產學研究課程(業師課程或企業實習)申請免修，同意免修之產學研究課程不得計入應修學分數 18 學分(逕博生 24 學分)。</p> <p>二. 應修習並通過本校語言/寫作中心開設之研究生英文課程兩門或(本校)博士班英語能力考核。英文修習可使用第三方公正機構之英文檢定成績來抵免，抵免標準由本所另訂定之。</p> <p>三. 學術研究倫理教育課程為必修教育課程，採網路教學方式，課程總測驗成績應達及格標準，但不計入應修學分數。</p> <p>四. 若課名、課綱超過三成相同時視為修習重複課程，僅擇一認列畢業學分。</p> <p>五. 未盡事宜以本所通過之修業規章為準。</p>

Institute of Pioneer Semiconductor Innovation

Ph.D. Program

Academic Year 2025

Duration of Study	Two to Seven years
Minimum Credits Required	18 Credits (including at least 6 credits of core courses and least 6 credits of required elective courses)
Minimum Credits Required for Direct Admission without MS Degree	24 Credits (including at least 6 credits of core courses and 12 credits of required elective courses, Seminar and dissertation research excluded)
Curriculum and Regulations	<p>I. Students are required to complete thesis seminars over two semesters. However, these seminars shall not be counted toward the required 18 academic credits for graduation. Students may apply for a waiver of the thesis seminar requirement by completing industry-academia research courses offered by the college (including courses taught by industry professionals or corporate internships). Courses approved for such a waiver shall not be counted toward the required 18 academic credits..(Direct Admission without MS Degree 24 credits)</p> <p>II. Students must pass two English courses offered by the Language Teaching and Research Center of the University or the English Proficiency Test. Application for the waiver of English courses may be applied by the students who meet the requirements regulated by the institute for the English Proficiency Test.</p> <p>III. Students are required to take and pass the online course of Academic and Research Ethics by the end of the first semester of their enrollment. This will not be counted for the required credits for graduation.</p> <p>IV. If the course title and syllabus overlap by more than 30%, the courses will be considered duplicates, and only one of them may be counted toward the graduation credit requirement.</p> <p>V. For additional details, refer to the “PhD Program Academic Regulations” of the Institute of Pioneer Semiconductor Innovation.</p>