National Cheng Kung University

Academy of Innovative Semiconductor & Sustainable Manufacturing

MS and PhD programs with thesis on

- ◆ Integrated Circuit Design
- ◆ Semiconductor Process Technology
- ◆ Semiconductor Packaging and Testing
- ◆ Key Materials
- ◆ Smart and Sustainable Manufacturing

Course credit requirements

MS: 24 credits plus thesis

PhD: 18 credits plus thesis

Integrated Circuit Design

Core Competency			
Core 1: Artificial Intelligence (choose one)			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Big Data Analysis and Cloud Computing		3
M, PhD	Introduction and Practices of Artificial Intelligence		3
Core 2: Sustainability			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Introduction of Sustainable Energy		3
Required			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Thesis	V	Master:6 PhD:12
M, PhD	Seminar(1), Seminar(2), Seminar(3),Seminar(4)	V	0
Elective-assinged by the program			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Advanced Topics in Electronic System Level Design		3
M, PhD	Advanced Topics on Analysis and Design of Power Management Integrated Circuits		3
M, PhD	Analog IC Design		3
M, PhD	Biomedical Integrated Circuit Design		3
M, PhD	Digital IC Design		3
M, PhD	Fundamentals of Digital IC Design(I)	V	0.5
M, PhD	Fundamentals of Digital IC Design(II)	V	0.5
M, PhD	Fundamentals of Digital IC Design(III)	V	0.5
M, PhD	Graph Theory		3
M, PhD	Introduction to Energy Harvesting Electronics Design		3
M, PhD	Mixed-Signal Silicon IP Design		3
M, PhD	Physical Design for Nanometer ICS		3
M, PhD	Radar Sensor Integrated Circuit Design		3
M	Radio Frequency Integrated Circuit Design		3
M, PhD	Special Topics on Design of Digital Signal Circuits		3
M, PhD	Special Topics on Networking IC Analysis and Design		3
M, PhD	Special Topics on RF Oscillator Circuit Design		3
M, PhD	Special Topics on VLSI for Digital Communications		3
M, PhD	System-on- Achip of Biomedical Monitoring Applications		3
M, PhD	The Essentials of Semiconductor Technology and Supply Chains	V	2
M, PhD	Theory and Application of Formal Verification		3
M, PhD	VLSI SoC Hardware/Software Codesign		3
M, PhD	VLSI Testing		3

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Semiconductor Process Technology

Core Competency				

Core 1: Artificial Intelligence (choose one)

Level	Course Title	English Taught	Credit Points
M, PhD	Big Data Analysis and Cloud Computing		3
M, PhD	Introduction and Practices of Artificial Intelligence		3

Core 2: Sustainability

Level	Course Title	English Taught	Credit Points
M, PhD	Introduction of Sustainable Energy		3

Required			

Level	Course Title	English Taught	Credit Points
M, PhD	Thesis	V	Master:6 PhD:12
M, PhD	Seminar(1), Seminar(2), Seminar(3),Seminar(4)	V	0

Elective			

Level	Course Title	English Taught	Credit Points
M, PhD	Advanced Technologies of Semiconductor Equipment		3
M	Applied Materials - Semiconductor and Display Technology		3
M, PhD	Electronic Ceramics		3
M, PhD	Electronic Materials Engineering		3
M, PhD	Fundamentals of Pn Junctions		3
M, PhD	Gas Discharge Processes and Plasma Engineering		3
M, PhD	High Speed Devices		3
M, PhD	Introduction to Lithography		1
M, PhD	Introduction to Semiconductor Lasers		3
M, PhD	Laser Engineering		3
M, PhD	Nano-Node Semiconductor Introduction		3
M, PhD	Opto-Electronic Devices Physics		3
M, PhD	Physics of Semiconductor Devices		3
M, PhD	Power Semiconductor Devices and Integrated Circuits		3
M, PhD	Semiconductor & Advance Nanotechnology Process Introduction(1)		3
M, PhD	Semiconductor Device, Applications, and Reliability		3
M, PhD	Semiconductor Devices Modeling & Simulation	V	3
M, PhD	Semiconductor Physics and Devices for Optoelectronics	V	3
M, PhD	Special Topics of Acoustic & Electric-Optical Devices		3
M, PhD	Special Topics on Microwave Semiconductor Devices and Integrated Circuits		3
M, PhD	Special Topics on Microwave Semiconductor Devices and Integrated Circuits		3
M, PhD	Special Topics on Physics Optical Filber Communication Devices		3
M, PhD	The Essentials of Semiconductor Engineering-Fundamentals of Device Physics and Fabrication	V	0.5

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Semiconductor Packaging & Testing

Core Competency			
Core 1: Artificial Intelligence (choose one)			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Big Data Analysis and Cloud Computing		3
M, PhD	Introduction and Practices of Artificial Intelligence		3
Core 2: Sustainability			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Introduction of Sustainable Energy		3
Required			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Thesis	V	Master:6 PhD:12
M, PhD	Seminar(1), Seminar(2), Seminar(3),Seminar(4)	V	0
Elective			
Level	**Course Title**	**English Taught**	**Credit Points**
M, PhD	Advanced C+C2:C30haracterization of Materials		3
M, PhD	Advanced Characterization of Materials	V	3
M, PhD	Advanced Electronic Packaging		3
M, PhD	Advanced Technologies of Semiconductor Equipment		3
M	Applied Materials - Semiconductor and Display Technology		3
M, PhD	C# Programming Design		3
M, PhD	High-Resolution Transmission Electric Microscopy		3
M	IC Process integration and Measurement		3
M, PhD	Industry 4.1:intelligent Manufacturing With Zero Defects	V	3
M, PhD	Intelligent Manufacturing Systems	V	3
M, PhD	Intelligent Manufacturing Systems		3
M	Introduction of Sustainable Materials	V	3
M, PhD	Kinetics of Materials		3
M, PhD	Lean Enterprise Systems		3
M, PhD	Manufacturing System Management		3
M, PhD	Materials Science of Thin Film		3
M	Micro/Nanofabrication and Device Design Principles		3
M, PhD	Optical Properties of Materials		3
M	Optical Spectroscopy of Inorganic Solids		3
M, PhD	Physical Properties of Ceramic Materials		3
M	Physics of Semiconductor Materials and Devices		3
M, PhD	Polymer Processing		3
M, PhD	Polymers for Electronic and Photonic Applications		3
M, PhD	Process Integration and Device Measurement	V	0.5
M, PhD	Semiconductor Engineering	V	3
M, PhD	Smart Machining Systems		3
M, PhD	Solid State Thermodynamics		3
M, PhD	Solid State Thermodynamics	V	3
M, PhD	Special Topic on Atomic-Level Simulations		3
M, PhD	Special Topic on Peptide Chemistry and Application		3
M, PhD	Special Topic on Polymer Crystallization	V	3
M, PhD	The Essentials of Semiconductor Technology and Supply Chains	V	2
M, PhD	The Fabrication and Applications of Lithium Batteries		3
M, PhD	Viscoelasticity		3

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Core 2: Sustainability				
Level	**Course Title**		**English Taught**	**Credit Points**
M, PhD	Introduction of Sustainable Energy			3
Required				
Level	**Course Title**		**English Taught**	**Credit Points**
M, PhD	Thesis		V	Master:6 PhD:12
M, PhD	Seminar(1), Seminar(2), Seminar(3),Seminar(4)		V	0
Elective				
Level	**Course Title**		**English Taught**	**Credit Points**
M, PhD	Advanced Characterization of Materials			3
M, PhD	Advanced Chemical Engineering Thermodynamics			3
M, PhD	Advanced Chemical Engineering Thermodynamics		V	3
M, PhD	Application of Plasma Phenomena		V	3
M, PhD	Artificial Photosynthesis			3
M, PhD	Chemical Engineering(1)		V	3
M, PhD	Combinatorial Materials Synthesis and Application		V	3
M, PhD	Electrochemistry-Principles and Green Applications			3
M, PhD	Functional Analysis(1)			3
M, PhD	Harmonic Analysis(1)			3
M, PhD	Materials Characterizations			3
M	Materials Science and Engineering		V	3
M, PhD	Microscopy			3
M, PhD	Nanomaterial Synthesis and Techniques		V	0.5
M, PhD	Nano-Materials		V	3
M	Optical Properties of Materials		V	3
M, PhD	Organic Electro-Optical Materials, Principles, and Device Applications			3
M, PhD	Physical Properties of Ceramic Materials			3
M, PhD	Plasma Diagnostic		V	3
M, PhD	Plasma Waves and Heating		V	3
M, PhD	Principles of Biomedical Spectroscopy			3
M, PhD	Principles of Biomedical Spectroscopy			3
M, PhD	Pulsed Power System		V	3
M	Semiconductor Devices Physics			3
M, PhD	Semiconductor Photoelectrochemistry			3
M, PhD	Semiconductors Nano-Processes Technology		V	3
M, PhD	Solid State Physics			3
M, PhD	Solid State Physics (1)		V	3
PhD	Solid-State Lighting			3
M, PhD	Surface Analysis			3
M, PhD	The Essentials of Semiconductor Technology and Supply Chains		V	2
M, PhD	The Theories and Applications of Laser		V	3
M, PhD	Thin-Film Electrochemical Processes and Applications			3
M, PhD	Wide Bandgap Semiconductor Materials and Devices			3
M, PhD	X-Ray Crystallography	※ Subject to change		3

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M, PhD	Introduction and Practices of Artificial Intelligence		3
Core 2: Sustainability			
Level	Course Title	English Taught	Credit Points
M, PhD	Introduction of Sustainable Energy		3
Required			
Level	Course Title	English Taught	Credit Points
M, PhD	Thesis	V	Master:6 PhD:12
M, PhD	Seminar(1), Seminar(2), Seminar(3),Seminar(4)	V	0
Elective			
Level	Course Title	English Taught	Credit Points
M, PhD	Adsorption Principles and Structure Character of Porous Material	V	3
M, PhD	Advanced Chemical Reaction Engineering		3
M, PhD	Advanced Chemical Reaction Engineering	V	3
M, PhD	Advanced Technologies of Semiconductor Equipment		3
M, PhD	Analytical Electrochemistry		3
M, PhD	Applications of Process Simulation		3
M	Applied Materials - Semiconductor and Display Technology		3
M, PhD	Biological Principles for Environmental Engineering	V	3
M, PhD	Biomedical Tribology	V	3
M	Ceramic Fabrication Processes	V	3
M, PhD	Chemical Engineering(1)	V	3
M, PhD	Crystal Chemistry		3
M, PhD	Digital Ic Design		3
M, PhD	Digital Twin and IC Packaging	V	0.5
M, PhD	Electrochemistry-Principles and Green Applications		3
M, PhD	Environmental Nano Technology	V	3
M, PhD	Industry 4.1:Intelligent Manufacturing With Zero Defects	V	3
M, PhD	Intelligent Manufacturing Systems	V	3
M	Introduction of Sustainable Materials	V	3
M, PhD	Introduction to Multiscale Materials Modeling	V	1

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	Elective		
Level	Course Title	English Taught	Credit Points
M, PhD	Kinetics of Materials		3
M, PhD	Machine Learning in Engineering Science		3
M, PhD	Materials and Devices for Sustainable Energy	V	3
M, PhD	Mathematical Principles of Environmental Engineering	V	3
M, PhD	Molecular Simulation		3
M, PhD	Nanomaterials	V	3
M, PhD	Physical Principle of Environmental Engineering	V	3
M, PhD	Polymers for Electronic and Photonic Applications		3
M, PhD	Precision Machine Design		3
M, PhD	Python Programming for Interactive Game Design		3
M, PhD	Resource Engineering		2
M, PhD	Solid State Ionic Devices	V	3
M, PhD	Solid State Thermodynamics	V	3
M, PhD	Solid State Thermodynamics		3
M, PhD	Special Topic on Atomic-Level Simulations		3
M, PhD	Special Topic on Peptide Chemistry and Application		3
M, PhD	Special Topics of Tribology	V	3
M, PhD	The Fabrication and Applications of Lithium Batteries		3
M	Theory of Combustion	V	3
M	Urban Mining and Circular Economy		3
M, PhD	Viscoelasticity		3

※ Subject to change

Discipline Integration for Sustainable Innovation –

The Academy integrates scientific knowledge and engineering expertise across disciplines, pioneers cutting-edge technologies, nurtures potential talents, and advances next-generation sustainable development for the semiconductor industry.

Join us at NCKU AISSM!

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