NCKU 1931 × AISSM

2026 NCKU AISSM Semiconductor Summer School

Explore Taiwan, Where Semiconductor Innovation Meets Global Connections

July. 28th - August. 7th, 2026

NCKU AISSM Semiconductor Summer School

The 2026 NCKU AISSM Semiconductor Summer School will offer three specialized tracks focused on integrated circuit design, semiconductor manufacturing, and packaging and testing. The three courses aim to provide essential, up-to-date knowledge for students aspiring to excel in these fields. This program continues NCKU AISSM's ongoing commitment to fostering international exchange and collaboration in semiconductor education and research, with strong support from industry and government.

In addition to academic learning, participants will have the opportunity to explore Taiwan's rich cultural heritage, enhancing their overall experience. The program is open to international students from NCKU's partner universities and students from NCKU too.

Contents

Course Offering

Course A: Digital IC Design and Synthesis

Course B: Analog IC Design and Layout

Course C: Advanced Semiconductor Manufacturing and Packaging Testing

*Students select one course track based on their interests and background.

Course A: Digital IC Design and Synthesis

Offered by the Program on Integrated Circuit Design

Course Credit: 3, Course Spots: 25

Prerequisite: Electronics related to MOSFETs and basic circuits, Digital Logic System, Computer Organization, Verilog Basic Skills (coding experience of at least 100 lines) Appropriate level: senior undergraduate and fresh graduate students. An official transcript must be provided as proof of completion of microelectronics-related courses.

Language: Taught in English; **Format**: In-person

Completion: NCKU transcript and Certificate

Lih-Yih Chiou

Lecturer: Prof. Lih-Yih Chiou, Director of PICD

PhD, VLSI and Circuit Design, Purdue University

Dept. Electrical Engineering & Program on Integrated Circuit Design, NCKU

Area: IC Design/Electrical Engineering

Chuen-Yau Chen

Lecturer: Prof. Chuen-Yau Chen

PhD, Electrical Engineering, NCKU

Department of Electrical Engineering, National University of Kaohsiung, Taiwan

Area: IC Design, Blind Signal Processing

Course A: Digital IC Design and Synthesis

Course Description

The next-generation electronic system will have billions of transistors on a chip. To design such a complex system, designers must understand the principles of module design and the use of primary EDA tools to address this daunting task. The course targets senior undergraduate or fresh graduate students to provide an adequate background for designing a moderate-sized system and emphasizes the balance between theory and hands-on. Upon completing this course, you shall have a. This course will teach you 1) digital VLSI system design flow, 2) primary EDA tools, and 3) moderate-size HDL coding.

Topics and lab work include

1. Medium-level Verilog
2. Structure Modeling & Behavioral Modeling
3. Combinational and Sequential Modules
4. Synthesis Concepts and Tools
5. Design for Synthesis
6. Design Challenges

Course B: Analog IC Design and Layout

Offered by the Program on Integrated Circuit Design

Course Credit: 3, Course Spots: 25

Prerequisite: Electronic circuits (intermediate level)、Microelectronic circuits, Electronics related to MOSFETs, and basic circuits. An official transcript must be provided as proof of completion of microelectronics-related courses.

Language: Taught in English; **Format**: In-person

Completion: NCKU transcript and Certificate

Course B: Analog IC Design and Layout

Shuenn-Yuh Lee

Lecturer: Prof. Shuenn-Yuh Lee

PhD, Electrical Engineering, NCKU

Dept. Electrical Engineering & Program on Integrated Circuit Design, NCKU

Area: Implantable telemetry device/Bio-signal (ECG) acquisition system on a chip (SOC)/Low-power circuits for wireless biomedical circuits and systems/Digital system: DSP chip for feature extraction, baseband chip for healthcare system/Wearable device with internet of thing (IOT) system on a chip (SOC)

Da-Huei Lee

Lecturer: Prof. Da-Huei Lee

PhD, Electrical Engineering, NCKU

Department of Electronic Engineering, Southern Taiwan University of Science and Technology

Area: Mixed signal integrated circuit, ADC/DAC, MEMS, delta-sigma modulation

Course Description

Analog integrated circuits are integrated circuits that make a representation of continuous signals in electrical form. They are circuits dealing with signals free to vary from zero to full power supply voltage. Examples of analog integrated circuits are operational amplifiers, power management circuits, and sensors. To design such a circuit, designers must understand the device physics, transistor amplifier, differential amplifier, and operational amplifier. The course targets provide the senior undergraduate or fresh graduate students to learn the basic design of analog integrated circuits and simulation. Upon completing this course, you shall learn the skills including 1. Basic MOS Device Physics, 2. Single-stage amplifier, 3. Frequency response, 4. Operational amplifier

Course B: Analog IC Design and Layout

Topics and lab work include

1. Basic MOS Device Physics (Lab. 1: Classic NMOS & PMOS IDS-VDS Curve)
2. Single-Stage Amplifier (Lab. 2:Full Adder Design)
3. Passive and Active Current Mirror and Frequency Response of Amplifiers (Lab. 3: Pre-Layout Simulation of Inverter)
4. Ideal OPAMP and Basic OPAMP Architecture (Lab. 4: Layout & Post-Layout Simulation of Inverter)
5. Advanced Layout of OPA (Lab. 5:Single-Ended Differential Two-Stage OPAMP Design)
6. Stability and Frequency Compensation and Two-Stage OPAMP (Lab. 6:Layout & Post-Layout Simulation of Single-Ended Differential Two-Stage OPAMP)

Course C: Advanced Semiconductor Manufacturing and Packaging Testing

Jointly offered by the Program on Semiconductor Manufacturing Technology, the Program on Semiconductor Packaging and Testing

Course Credit: 3, Course Spots: 25

Appropriate level: senior undergraduate and fresh graduate students with a science and engineering background

Language: Taught in English; **Format**: In-person

Completion: NCKU transcript and Certificate

Wen-Dung Hsu

Director Prof. Wen-Dung Hsu, PSPT

Ph.D. of Materials Science and Engineering, University of Florida, Gainesville, USA

Dept. Department of Materials Science and Engineering & Program on Key Materials, NCKU

Area: molecular dynamics simulation/Monte Carlo simulation/first principle simulation/coarse-graining molecular dynamics simulation/nano-materials/carbon based materials/transition metal clusters/nano-tribology/nano-mechanics.

Wei-Chen Tu

Director Prof.. Wei-Chen Tu, PSMT

PhD, Electronics Engineering, National Taiwan University

Dept. Electrical Engineering & Program on Semiconductor Manufacturing Technology, NCKU

Area: Low dimensional materials and devices/Optical and electrical simulation of nanomaterials and nanodevices /Photodetectors/ Solar cells/Nanoscience and nanotechnology/Applications of quantum dots

【Nanophotonic devices】

Jui-Nung Liu

Lecturer: Prof. Jui-Nung Liu

PhD, Electrical and Computer Engineering, University of Illinois at Urbana-Champaign

Dept. Electrical Engineering and Institute of Microelectronics &Program on Semiconductor Manufacturing Technology, NCKU

Area: Mid-infrared group-IV photonics/Optical nanocavity/ Surface-enhanced vibrational spectroscopy/Cavity QED

Description

This session provides an introduction to nanophotonics based on semiconductors and their device applications. Several important types of optical resonators will be introduced.

【Semiconductor Fabrication】

Ying-Yuan Huang

Lecturer: Ying-Yuan Huang

PhD, Electrical and Computer Engineering, Georgia Institute of Technology

Dept. Electrical Engineering and Institute of Microelectronics &Program on Semiconductor Manufacturing Technology, NCKU

Area: Microelectronics, Electrical Engineering

Description

Semiconductor Fabrication delves into the heart of the microelectronics industry, focusing on the manufacturing process of semiconductor devices. This session offers students an essential understanding of the steps involved in the fabrication of semiconductors, including material preparation, chemical/physical vapor deposition, photolithography, etching, and ion implantation. Students will gain insight into the sophisticated processes and innovations that enable the production of ever-smaller and more powerful semiconductor devices.

Lecturer: Prof. Chao-Hung Wang

PhD, Materials Science and Engineering, NCKU

Miin Wu School of Computing & Program on Semiconductor Manufacturing Technology, National Cheng Kung University

Area: Emerging Non-Volatile Memory Materials and Devices, Neuromorphic Computing Analog Circuit Design, and Neuromorphic Computing Algorithms

【Semiconductor Materials】

Description

This session introduces the fundamental properties and applications of semiconductor materials. Topics include crystal structures, electronic band theory, charge carriers, doping, and transport phenomena. The course also covers key semiconductor materials such as silicon, compound semiconductors, and emerging materials, along with their roles in electronic and optoelectronic devices. Emphasis is placed on linking material properties to device performance and modern semiconductor technologies.

【Neural Networks】

Description

This session provides an introduction to neural networks and their fundamental principles. Topics include basic neuron models, network architectures, learning algorithms, and training methods. The course covers multi-layer perceptrons, convolutional neural networks, and deep neural networks, with applications in pattern recognition, signal processing, and artificial intelligence, emphasizing the connection between mathematical foundations and practical implementations.

【Quantum applications of the defects in semiconductor materials】

Yu-Chen Chen

Lecturer: Dr. Yu-Chen Chen

PhD, Materials, University of Oxford

Assistant Research Fellow, Academia Sinica

Area: Quantum optics/ Physics

Description

This session will introduce the basic knowledge of various quantum technologies and focus on the quantum aaplications of the defects in semiconductors.

【Semiconductor Fabrication】

Albert Lan

Lecturer: Mr. Albert Lan

Global Sr. Packaging Account TD Head, Applied Materials, USA

Over 30 years of job experience in semiconductor industry, esp. advanced packaging technologies.
Senior Engineering Center Director, 14 years, SPIL
PD, Quality, & Sales, 6 years, Amkor Taiwan

Area: Advanced 3D Heterogeneous Integration Packaging Technology Development

Description

- Worldwide Innovative 3DHI Packaging Technology Trend
- Innovative 3DHI Packaging Technology Development Applied in AI/HPC – C2W/ W2W Hybrid Bonding
- Innovative 3DHI Packaging Technology Development Applied in AI/ HPC – FO-PLP and Advanced Substrate

Jacy Liao

Lecturer: Mr. Jacy Liao

Master, Electrical Engineering, NCKU

Senior Manager, Global Technical Learning Center, Applied Materials

Area: Semiconductor Ion Implanter, Metal Deposition, Equipment/Process

【Vacuum System 】

Description

This session is designed for those individuals in the semiconductor industry who require the knowledge and
skills to work on the vacuum system.

Agenda:
1. Basic Vacuum Theory
2. Vacuum System Overview
3. Vacuum Pump Introduction
4. Vacuum Gauge Introduction
5. Leak Check Technology

【Cleanroom Technology】

Description

This session is designed for those individuals in the semiconductor industry who require the knowledge and skills to familiar with Cleanroom Technology.

Agenda:
1. Semiconductor device scaling
2. Particle
3. Cleanroom overview
4. How to protect the devices on wafer -- Wafer transfer/storage/shipping
5. Cleanroom Protocol -- Gowning Practice

【Lithography & Mask Technology】

Frederick

Lecturer: Dr. Frederick

PhD, Automation and Control Engineering, NTUST

Process Engineer, Applied Materials

Area: Photolithography, Computational lithography

Description

As technology nodes continue to shrink, advanced lithography techniques play an increasingly essential role in shaping the speed, power efficiency, and complexity of today's chips. Photolithography is a key microfabrication technique that uses light, precision optics, mechanical control, and materials engineering to transfer circuit design patterns onto a wafer.

This session will cover:

1. Introduction of photolithography.
2. Today of photolithography.

【Latest Innovations and Challenges of Semiconductor Technology for 3nm Node and Beyond】

Kevin Hsiao

Lecturer: Mr. Kevin Hsiao

Material Science & Engineering, NTHU

Technical Project Manager, Applied Materials

Area: Semiconductor fabrication and integration / Logic advanced node development to large scale production project / CVD & ALD process and product development

Description

- Moore's Law described in 1965 will celebrate its 60th anniversary in 2025. It successfully predicted the economic benefits of continuous semiconductor scaling. We observed its amazing achievements in the past that had dramatically changed the way we live. The recent explosive growth of Artificial Intelligence (AI) requires even more advanced semiconductor technology. Taiwan plays a critical role as hub of semiconductor R&D and manufacturing powerhouse to fulfill the needs.
- In this session, the latest innovation of semiconductor process to drive the success of advanced technology nodes will be described, from transistor structure evolution, to impact and challenges of each process technologies including lithography/deposition / etch / CMP.
- Furthermore, the future challenges and opportunities beyond 3nm nodes to keep Moore's Law alive, such as Gate-All-Around (GAA) structure, backside power rails, and chiplet heterogeneous integration will also be presented.

【Applications of Numerical Simulation in the IC Packaging Industry】

Li-Hsuan Shen

Lecturer: Dr. Li-Hsuan (Leo) Shen

Ph.D. Civil Engineering, National Taiwan University

Senior Manager of R&D and IC Packaging Product Manager, Moldex3D (CoreTech System Co., Ltd.)

Area: Computational fluid dynamics, Numerical simulation, Structural analysis for IC packaging applications

Description

This session provides an in-depth exploration of the challenges faced in IC packaging, focusing on innovative solutions by applying mechanical theory, material science, and numerical simulation. Participants will gain a conceptual understanding of how these disciplines interact to address and overcome industry-specific difficulties.

【 IC Packaging Computer-Assisted Analysis Operation Course】

Goran Liu

Lecturer: Mr. Goran Liu

Master, Mechanical Engineering, National Cheng Kong University

Senior Technical Manager, Moldex3D (CoreTech System Co., Ltd.)

Area: Injection Molding Analysis/IC Packaging Stress Simulation/Warpage Simulation/IC Packaging Process Defect/Countermeasures

Description

This session starts with the IC package 2D design drawing to construct a 3D mesh, sets the package material parameters and process conditions, and then performs filling, curing, and warpage analysis.

The analysis results are used to illustrate common defects in packaging and to propose design change and improvement directions.

Special Lecture Session with TSRI: At VLSI Design and CAD–Focused Event

Course A &B

Students will participate in the VLSI Design / CAD Symposium for a half-day on August 4 to attend a TSRI lecture session. Research experts from the Taiwan Semiconductor Research Institute (TSRI), a national institute whose research and service platforms are essential to Taiwan's semiconductor industry, will introduce TSRI's advanced research platforms, process technologies, and design–manufacturing integration capabilities. These lectures provide students with exposure to current research directions and real-world challenges in advanced chip design.

Students will also have access to the symposium exhibition, a major academic forum led by the Taiwan IC Design Society (TICD) that showcases breakthrough research and advanced design technologies. Serving as a premier platform for scholarly exchange in VLSI design, computer aided design (CAD), and electronic design automation (EDA), the symposium highlights state of the art methodologies and emerging trends in electronic design. Participation will allow students to engage with the broader research community and observe the latest developments in integrated circuit design and automation.

【Institute Visit -Academia Sinica South Campus】

Course C

Students will visit Academia Sinica, Taiwan's premier national research institution dedicated to fundamental and interdisciplinary research. The visit focuses on facilities of the Research Center for Critical Issues (RCCI), which provides shared research platforms supporting advanced scientific and technological studies.

The program includes an introduction to the Quantum Optoelectronics Advanced Fabrication and Precision Analysis Facility, featuring advanced tools for device fabrication, materials processing, and high-precision characterization relevant to emerging electronic and photonic technologies. Students will also visit the Advanced Solar Cell Research and Measurement Facility, which supports solar cell development and materials analysis through comprehensive measurement and testing capabilities for energy-related research.

This visit offers a focused overview of how Academia Sinica's research infrastructure supports frontier research and talent development in Taiwan.

【Industry Visit - ASML】

Course C

ASML is a global leader in advanced semiconductor lithography systems and a key enabler of cutting-edge chip manufacturing worldwide. The company is best known as the sole supplier of EUV (Extreme Ultraviolet) lithography systems, which are essential for advanced technology nodes and play a critical role in enabling innovation across AI, high-performance computing, and automotive electronics.

ASML places strong emphasis on engineering excellence, interdisciplinary collaboration, and long-term talent development, supporting a highly skilled workforce capable of managing complex, high-precision systems. As part of the program, a brief company visit will be arranged to provide participants with a contextual understanding of ASML's operations and work environment, complemented by technical and career-sharing sessions led by professionals from diverse roles, with a focus on practical engineering work and real-world industry experience.

Tainan In-Depth Cultural Exploration

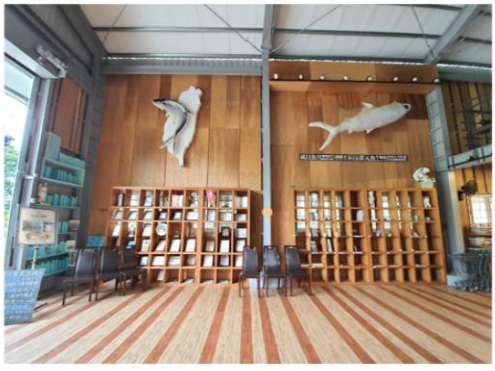
These extracurricular options are available for students from all course tracks to sign up. Additional fees required. Each outing is limited to 30 spots.

Each one-day cultural excursion described below offers students an engaging introduction to Tainan's history, local traditions, and coastal heritage through guided walks, hands-on cultural activities, and regional cuisine.

By exploring historic districts, nature-inspired landscapes, and long-standing local businesses, students gain meaningful insight into Tainan's living culture and everyday practices. Designed to complement the academic program, these excursions provide valuable cultural context beyond the classroom while remaining relaxed, enriching, and enjoyable.

8/1 (Sat) - Anping Culture & Coast

- Anping Sword Lion painting DIY and Old Street cultural walk
- Lunch featuring a local Tainan specialty
- Milkfish ball–making DIY workshop
- Coastal walk at Yuguang Island



8/2 (Sun) - Sicao & Mazu

- Green Tunnel wetland boat tour
- Visit to Luermen Mazu Temple
- Taiwanese seafood lunch
- Traditional Chinese medicine tour and DIY experience

Chinese Language Course

Post-program elective for 10 students only

This Chinese language course is designed to strengthen students' practical communication skills, with a primary focus on daily spoken Chinese, supported by basic reading and writing. Through meaningful, real-life contexts, students engage in extensive listening and speaking practice, interactive tasks, and conversational activities that connect language learning with everyday life in Taiwan.

The course runs on weekdays from **August 10 to August 21, with morning and afternoon sessions, and is limited to 10 participants** to ensure an interactive learning environment. Students are encouraged to observe Taiwanese culture, document their local experiences, and apply newly acquired language skills through short presentations.
Please note that this course is optional and requires an additional fee.

Tien-Yun, Lu

M.Ed., Institute of Education, National Cheng Kung University

Instructor for the College Chinese & Program of Teaching Chinese as a Second Language, NCKU

Expertise: Specialized in curriculum design, instruction, and talent development for both academia and industry. Served as a Lead Instructor for the U.S. State Department's CLS Program, with experience in intensive courses, study tours, and industry-academic collaboration. Also served in a talent development role at a Fortune Global 500 company. Currently integrating academic and industry perspectives to develop interdisciplinary teaching.

Important Dates

Application

Early Bird: By March 31st, 2026 (Tue)

Application Deadline: April 19th, 2026 (Sun) (Confirmation Letter will be sent within seven working days after the registration information is reviewed and confirmed.)

Admission

Admission Letter: May 1st, 2026 (Fri)

*Students will use this document as part of their visa application for entry into Taiwan.

Payment Deadline: May 17th, 2026 (Sun)

Pre-Arrival Notification: June 21st, 2026 (Sun)

Program Period

- 7/27 (Mon): arrival in Tainan
- 7/28 (Tue) morning: Opening Ceremony and Campus Tour
- 8/1&8/2 (Sat & Sun): Cultural Tour-Tainan (optional)
- 8/7 (Fri) afternoon: Group Presentation and Closing Ceremony
- 8/10-8/21: the post-program Chinese language course (optional)

Completion

Certificate Issuance: August 7th, 2026 (Fri)

Transcript Issuance: September 11th, 2026 (Fri)

Fees Schedule

Applicants	Application Fee	Program Fee	Total Fee	Application Period
Early Bird International Students from a partner university	USD 200	USD 1,310	USD 1,510	By Mar 31, 2026
Early Bird International Students from a non-partner university		USD 2,184	USD 2,384	
Regular International Students from a partner university		USD 1,638	USD 1,838	By April 19, 2026
Regular International Students from a non-partner university		USD 2,730	USD 2,930	

Cultural Tour	8/1 (Sat) - Anping Culture & Coast **USD 130**
	8/2 (Sun) – Sicao & Mazu **USD 100**

Chinese Language Course	**USD 350**

Special Rates for AISSM's Partner Universities by Invitation

Nomination Deadline: March 27th, 2026

Nominated Students			
Application Fee	Program Fee	Total Fee	Application Period
USD 200	**USD 500**	**USD 700**	**By April 19, 2026**

NCKU AISSM offers **4 seats** with nominations at special rates for each strategic partner university by invitation.

Notes

1. The application fee is not refundable.
2. The program fee includes tuition, orientation, activities, and accident insurance of at least NT$1,000,000, valid for the entire program period.

   The program fee doesn't include: meals and accommodation.
3. The program fee is refundable with different proportions depending on the time of cancellation by the applicants. (Details announced on the program website)
4. The accommodation fee is NOT included. Participants will be responsible for their own housing. Recommended off-campus housing is listed below:

   - Rolling Pin Homestay
   - My My Homestays
   - Journey Hostel
   - 66 south
   - Boléro Homestay
   - Old Man Captain
   - Roaders Hotel
   - Academy Hotel

*More accommodation options are available in Tainan City through various hotel websites. Participants are advised to book their accommodation early, as summer is a high season for visitors.

Program Manager

Kacie Liu 劉芝晴

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National Cheng Kung University

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智慧半導體及永續製造學院
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2026 NCKU AISSM

SEMICONDUCTOR SUMMER SCHOOL

Official WEBSITE

The program content is subject to modification. Please consult the official program website for the most current information.