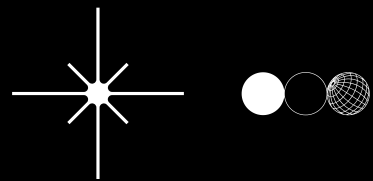


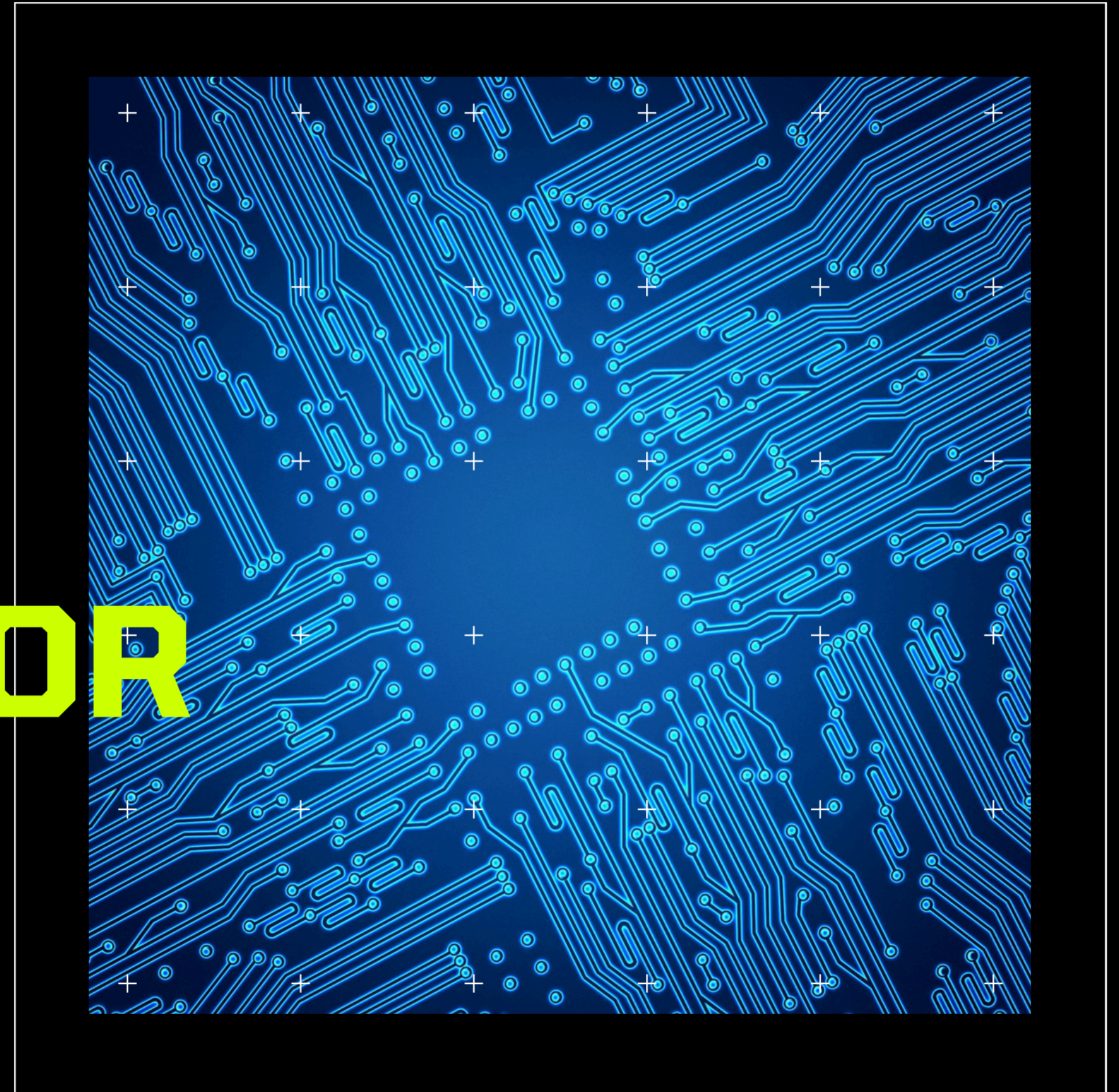
NYCU

NATIONAL  
YANG MING CHIAO TUNG  
UNIVERSITY



# ESSENTIAL SEMICONDUCTOR TECHNOLOGY MODULES

2025 SPRING SEMESTER



ORGANIZED BY:  
**OFFICE OF INTERNATIONAL AFFAIRS**

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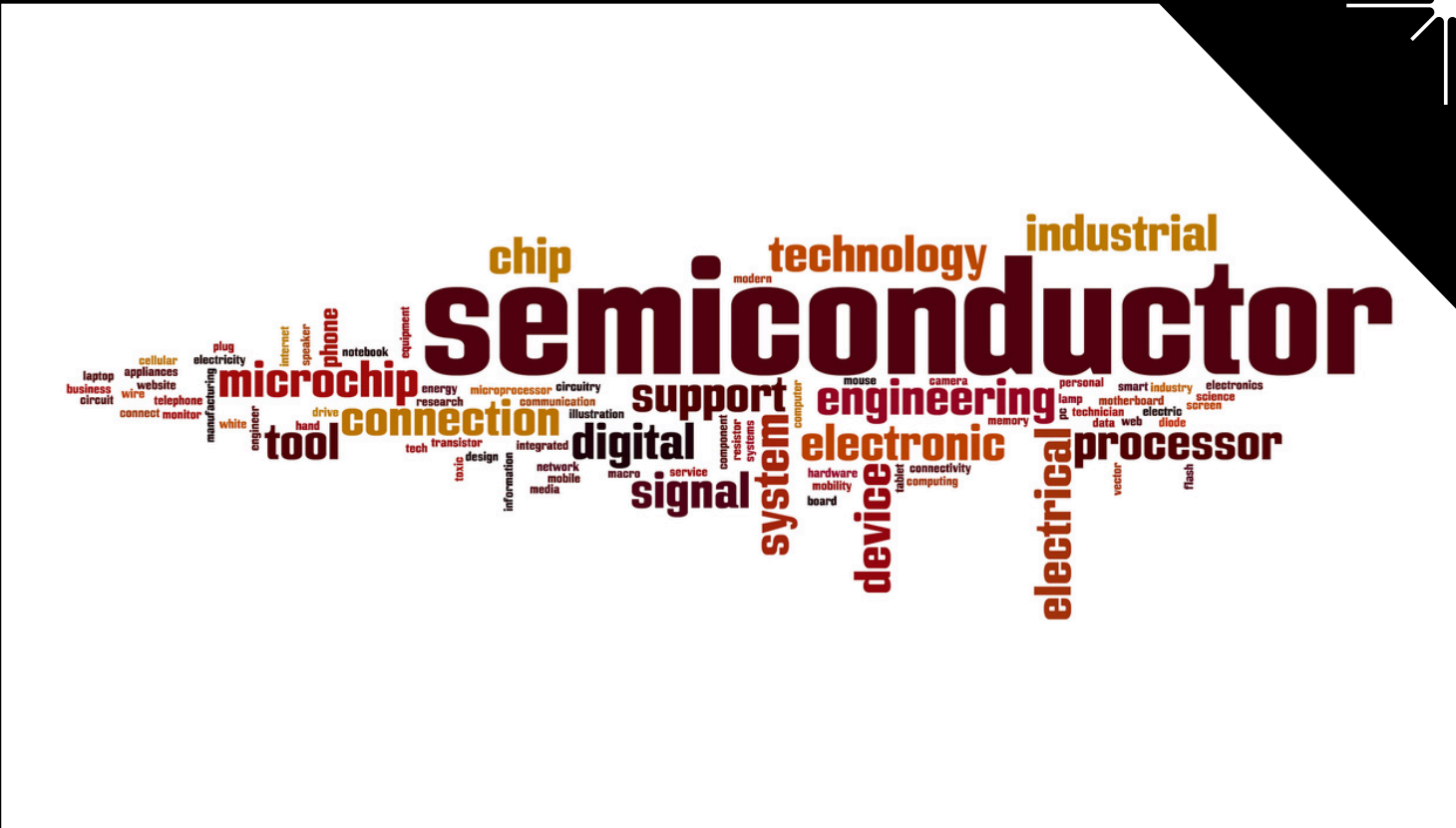
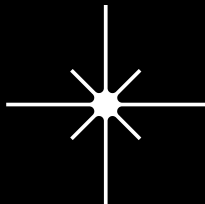
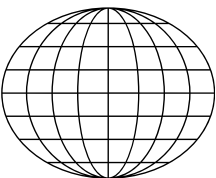
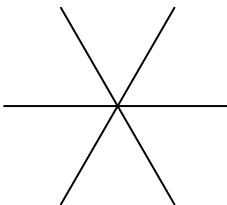
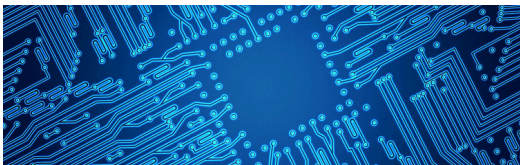
APPLICATION



# PURPOSES

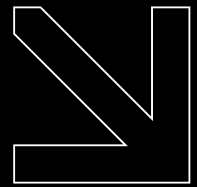


TO PROMOTE INTERNATIONAL UNDERSTANDING AND COLLABORATION WITH REGARD TO EDUCATIONAL, RESEARCH AND PROFESSIONAL ACTIVITIES IN FIELDS RELATED TO SEMICONDUCTOR TECHNOLOGY.



TO EQUIP STUDENTS WITH ESSENTIAL SEMICONDUCTOR TECHNOLOGY KNOWLEDGE AND ENLARGING THE FUTURE WORKFORCE IN RELATED FIELDS.

# OVERVIEW



## SEMESTER EXCHANGE STUDIES

students will be enrolled at NYCU in 2025 spring semester as exchange students.

students will choose 1 of the 3 EST modules. Each module consists of 3-6 courses and students are required to take at least 3 courses within each module. All courses are taught in English and worth 3 credits each.

in addition to the compulsory courses, students can also take free chinese language courses as well as other elective courses.

students in this program is eligible to apply for nycu inbound exchange scholarship for around ntd20,000 (approx. usd625).

upon completion of the semester, students will be issued with a certificate of completion of EST modules along with official transcript of records.



## SUMMER INTERNSHIP

students will be invited to apply for 2025 summer internship at NYCU labs or affiliated companies, including TSMC, Foxconn, Micron and MediaTek, etc. (Acceptance is not guaranteed.)

NYCU will provide stipend of NTD55,000 (approx. USD1700) for students choosing to conduct research internships at NYCU for at least 60 days.

affiliated companies will provide salaries to their interns plus some may offer housing benefits or flights reimbursements.

# MODULE 1

## DEVICE & INTEGRATION

### SEMICONDUCTOR PHYSICS AND DEVICES

### VLSI MANUFACTURE TECHNOLOGY (ONLINE)

### GREEN NANOTECHNOLOGY

In this class, the properties for the semiconductor materials, the physics of the carrier drift, and the operation principals for the most important devices architectures, i.e., Diode, BJT, MOSFET, and JFET, will be introduced and discussed in details. Furthermore, the recent progress and challenges in developing beyond Moore's law technologies will be reviewed.

This course provides a fundamental insight into the manufacturing technology of semiconductor devices and integrated circuits.

This course will introduce the principle of these nano-processes which is needed for research and development of green nano-devices. Examples of devices fabricated by these processes are also introduced.

**INTRODUCTION TO  
MATERIALS  
SCIENCE AND  
ENGINEERING**

Gain insight into the processing techniques and significance of metal alloys, ceramics, polymers, and composite materials. Acquire knowledge of the fundamental physical properties of materials, including electrical, optical, and thermal characteristics.

**PRINCIPLES AND  
APPLICATIONS OF  
MATERIALS  
CHARACTERIZATION  
TECHNIQUES**

Semiconductor materials can be widely used not only in electronic devices/integrated circuits, but also in energy storage devices (Li-ion batteries) and solar cells. The focus of the lectures will be on the analytical methods on materials, but not on devices, which can be applied to other physical and chemical scientific research topics. This course is designed for young semiconductor talent interested in characterization techniques applied to semiconductor materials.

**DIFFUSION**

Chapter 1 Thermodynamic and Kinetics  
Chapter 2 Driving Forces and Fluxes for Diffusion  
Chapter 3 Diffusion Mechanism (Equations and Solutions)  
Chapter 4 Atomic Theory of Diffusion  
Chapter 5 Coarsening (Ostwald Ripening) and Grain growth  
Chapter 6 Spinodal decomposition  
Chapter 7 Nucleation and Growth

# MODULE 2

## TOOL/EQUIPMENT ENGINEERING

**VLSI  
MANUFACTURE  
TECHNOLOGY  
(ONLINE)**

This course provides a fundamental insight into the manufacturing technology of semiconductor devices and integrated circuits.

**ELECTRICAL  
ENGINEERING  
FUNDAMENTALS**

The syllabus has not been released yet.

**MEDICAL IONIZED  
GAS AND DATA  
ANALYSIS**

The syllabus has not been released yet.

**VACUUM AND  
PLASMA  
TECHNIQUES**

The syllabus has not been released yet.



# MODULE 3

## INTELLIGENT MANUFACTURING

### INTRODUCTION TO ARTIFICIAL INTELLIGENCE

### MACHINE LEARNING FOR SIGNAL PROCESSING

### DATA STRUCTURES AND OBJECT- ORIENTED PROGRAMMING

Welcome to the Introduction to Artificial Intelligence! In recent years, we have witnessed tremendous progress in artificial intelligence (AI). For example, chatGPT can answer sophisticated questions specified by users. Stable diffusion can generate novel images that expert designers may be unable to draw. It seems that existing algorithms can do lots of incredible things. Have we solved the ultimate pursuit of AI? Are these amazing artifacts AI? What are the new challenges in AI? Please sign up for this course if interested in diving into this field!

In this course, we would discuss the connection between signal processing and machine learning. Specifically, we would focus on applying machine learning methods for signal processing. We will cover the fundamental concepts and methods of signal processing and machine learning, which are useful to solve practical engineering problems. Students will learn contemporary techniques for capturing signals, processing signals, enhancing signals, classifying signals, and learning from signals.

Understand well the fundamental programming concepts, e.g., system specification, dry run, statements, expressions, arrays, boolean operations (e.g., ||, &&), control structures (switch, if, if-else, for-loop, while-loop), math operations (e.g., +, \*, %), bitwise operations (e.g., |, ^, &), and recursive functions.

# OPTIONAL COURSES (6 ECTS EACH)

## CHINESE

- Chinese I to X
- Intro. Chinese Conversaton I to III
- Technical Chinese, Learn Mandarin by Listening to Podcasts, The Language of Romance in Mandarin

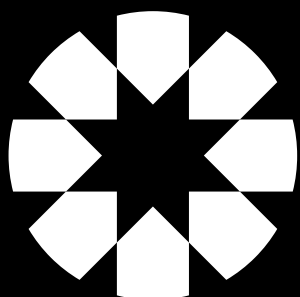
## OTHERS

- General education courses
- Physical education courses
- Courses in other disciplines

## MANAGEMENT OF TECHNOLOGY

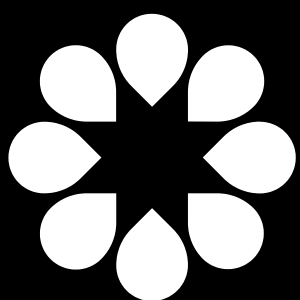
- Emerging Technology and Innovation Management
- Innovation Management and Sustainable Development

# ELIGIBILITY & TIMELINE



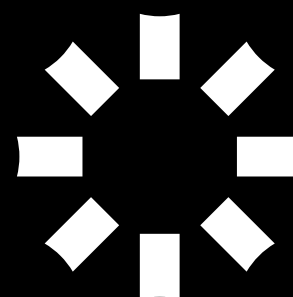
## 01. ENROLLMENT

Enrolled in a STEM degree program at a selected partner institution of National Yang Ming Chiao Tung University (NYCU).



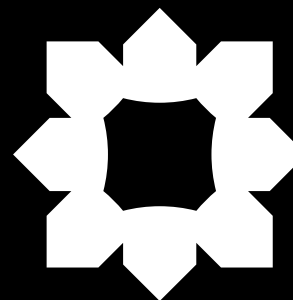
## 02. YEAR OF STUDY

Students must be in his/her Bachelor junior year to 1st year Master.



## 03. ACADEMIC PERFORMANCE

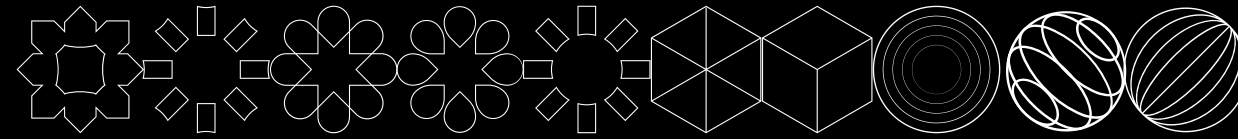
Minimum GPA of 3.0 out of 4.0 (equivalent to an overall grade of B).



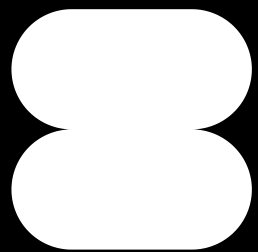
## 04. ENGLISH PROFICIENCY

English proficiency of CEFR B2 level and above. (TOEFL iBT 72, IELTS 5.5 and above, or the equivalent.)

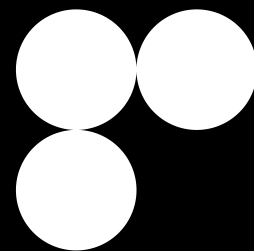
# APPLICATION



## 01. NOMINATION



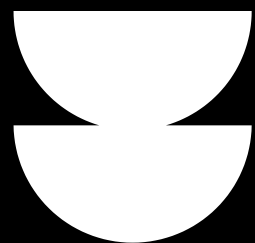
- Each applicant should rank the 2 modules according to his/her preference.
- Home institutions are responsible for nominating applicants via this nomination form by **Sep. 30**.



## 03. APPLICATION DOCUMENTS

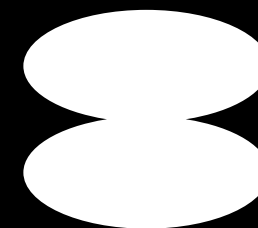
1. Curriculum vitae (CV) in English
2. Official transcript of records in English
3. Official certificate of enrolment at home institution
4. Passport (information page)
5. Proof of English proficiency
6. Supporting document (optional)
7. Recommendation letter (optional)

## 02. APPLICATION



- Admission to EST Modules is for Spring semester only (February to June).
- Nominated applicants will receive the link to the online application.
- Application deadline is **Oct 16**.

## 04. APPLICATION TO OPTIONAL SUMMER INTERNSHIP



Applicants who are interested in applying for the optional summer internships at NYCU labs or affiliated companies will be asked to apply separately at a later date.