

National Taiwan University of Science and Technology



NTUST

Department of Computer
Science and Information Engineering

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Words from the Department Chair

Dear New Students of Computer Science and Information Engineering Department:

Congratulations! You have made a wise decision at the turning of your lives—by choosing the National Taiwan University of Science and Technology as your next step in your pursuit of education. We wish to express our special welcome to you into the Department of Computer Science and Information Engineering, and are honored to grow with you in your academic career!

In order for you to plan your academic career and select your courses, we help our undergraduate and graduate students quickly understand the Department of Computer Science and Information Engineering, our program, features of specialized course instruction and the research and development of our faculty by compiling this department handbook which includes the following content:

Course programs in the department's specialized fields

Research areas of our department faculty

A number of regulations and measures

Each measure may have a great impact on every student, such as the procedure for applying for an advisor, the use of Direct Pursuit of Ph.D. Degree to shorten the number of years for the completion of the PhD program, and subsidies for outstanding students to pursue advanced studies or exchange abroad. So be sure to carefully read through your handbook.

Our faculty members all graduated from well-known national or overseas schools, are well experienced both academically and in practice, and are dedicated to teaching and advising student research. Please make the best of your education here by utilizing their help and discussing research related questions with them, studying related information on our department website on <http://www.csie.ntust.edu.tw>. If you have any questions or difficulties pertaining to your life or work, please seek the advice and assistance of your guidance counselor or academic advisor. The entire department staff is happy to provide you with the best educational environment. We also wish you an enriching and rewarding experience here at the National Taiwan University of Science and Technology Department of Computer Science and Information Engineering.

Tai-Lin Chin

Department Chair

Graduate Program

◎Required Courses

年級 Grade	第一學期	第二學期
一 1st.	論文研討(一) Seminar(1) Course code: EC5001301	論文研討(二) Seminar(2) Course code: EC5002301

◎CSIE graduate programs have a minimum of 150 students at any one time. Our faculties lead these students to ground-breaking research in a wide range of fields and use advanced techniques to address grand challenges at the frontiers of the natural and social sciences and across all engineering fields. To enhance their professional skills and satisfy students' intellectual curiosity, we offer a wide range of electives, which can be grouped into five main categories: Video and Audio Technology, Intelligent System and Machine Learning, Network Communication, Information Security and Cloud Computing, and Parallel Computing and Embedded System

Video and Audio Technology

- Speech Signal Processing
- Digital Audio and Computer Music
- Advanced Database Systems
- Digital Video Systems
- Computational Photography
- 3D Computer Game (I)(II)
- Image Processing
- Data Compression with Applications
- Image and Video Processing
- Digital Mesh Processing
- Computer and Robot Vision
- Special Topics on Android Projects
- Android Application Development

- Procedural Content Generation Computing
- Advanced Computer Graphics
- Advanced 3D Computer Game Engine Design and Implementation
- Deep Learning for Computer Vision Applications
- Practice of Digital Image Processing
- Practice of Computer Vision

Intelligent System and Machine Learning

- Machine Learning
- Neural Networks
- Knowledge-Based Systems
- Advanced Algorithms
- Robot Motion Planning
- Coding and Information Theory
- Introduction to Intelligent Robot Applications
- Advanced Machine Learning
- Data Mining
- Artificial Intelligence
- Big Data Analytics
- Practice of Social Media Analytics
- Intelligent Device Communications
- Electronic Commerce
- Introduction to Deep Learning and Its Applications
- Advanced Human Computer Interaction
- Information Retrieval and Applications
- Practices of Deep Learning

- Practice of Edge Intelligence and Computing
- Value of AI and Data
- Python and Its Applications in Machine Learning
- Machine Learning and Applications
- The Fundamental Implementation of Machine Learning

Network Communication

- Computer Networks
- Digital Wireless Communications and Networks
- Computer Simulation
- Mobile Computing
- Modeling and Analysis for Mobile Communication Networks
- Next-Generation Wireless Networks
- Intelligent Device Communications
- Wireless Communications and Network Security
- Wireless Communications and Internet of Things Security
- Software-Defined Networking and Network Function Virtualization
- Introduction to Blockchain and Its Applications
- Virtualized Networks and Applications
- Open Source 5G Networking Technology
- Advanced Modern Networking
- Optimization Theory and Applications
- Artificial Intelligence of Things

Information Security and Cloud Computing

- Information Security Practice

- Practices of Information Security
- Queueing Theory
- Machine Learning and Applications in Cybersecurity
- Cloud Computing and Services
- Practices of Network Security Technology
- Wireless Communications and Network Security
- Cloud Computing Information Security
- Information Security Practice
- Information Security
- Practices of Information Security

Parallel Computing and Embedded System

- High Performance Storage Systems
- Procedural Content Generation Computing
- Computer Architecture Simulation and Optimization
- Computer-Aided Design for VLSI System
- Practical Programming Techniques for System Development
- WebGL Programming
- Practice of Sensing System
- Practice of Advanced Sensing System
- FPGA Design Laboratory
- Advanced Compiler Design
- Advanced Computer Architecture
- Real-Time Scheduling Theory

Regulations for Graduate Course Enrollment

Educational System	Admission Qualification	Number of Years Permitted to Complete Program, Degree and Regulations
Doctorate Program Graduate Students	Graduated from a related department of a Ministry of Education approved domestic or overseas university or an independent institution. Must have a master degree and pass the university doctorate program admissions test, or qualify for direct pursuit of Ph.D. Degree, or pass the university doctorate program entrance examination.	2-7 years (Credits required to be conferred a doctorate degree: 18 credits, plus passing the oral test.)
Master Program Graduate Students	Graduated with a bachelor degree from a related department of a university or independent institute, or equivalent qualification and pass the university admissions test, or pass the university master program entrance examination.	1-4 years (Credits required to be conferred a master degree: 24 credits, plus passing the oral test.)

◎From the school year of 105, the master and doctoral students in National Taiwan University of Science and Technology should complete this course 「Basic Knowledge of Academic Ethics」 before the end of the first year. Graduate students can apply for the examination of degree only after they pass the course.

◎At least 1/3 (excluding intern credits) of the graduation credits for CSIE graduate students should be provided by college of EECS in National Taiwan University System.

◎Starting from the 112 academic year (Aug. 2023), new graduate students must log into the "Thesis/Dissertation and Advisor Information System" to register the research topics and objectives of their thesis. Students who do not comply with these regulations are not eligible to apply for the degree exam.

Profile

Name	Position	Office	Tel	Research Area
Kuo-Liang Chung	Chair Professor	T4-501	27376771	Deep Learning Theory and Applications, Image Processing and Video Compression, Color Image Processing and Applications
Huei-Wen Ferng	Distinguished Professor	T4-506	27301064	Deep Reinforcement Learning, Meta-Learning, Information Security, Network Security, 5G and Next-Generation Mobile Network, Internet of Things, Wireless Communications/Mobile Computing, Traffic Network, Applications of Artificial Intelligence, Advanced Networking Techniques, Simulation Techniques, Queueing Theory, Performance Analysis
Yuan-Shin Hwang	Professor	T4-512	27376746	Parallel Processing and Parallelizing Compilers, Compilation Techniques for Embedded Systems, Computer Architecture, Programming Languages
Wen-Kai Tai	Professor	RB-500	27376390	Computer Graphics, Game Development and Interactive Techniques, Game Engine, Web-based Information System
Jen-Wei Hsieh	Professor	T4-509	27376462	Flash-memory storage systems, Real-time systems
Hsing-Kuo Pao	Professor	T4-505	27301065	Machine Learning, Data Science, Computer Vision, Information Security

Name	Position	Office	Tel	Research Area
Wei-Chung Teng	Professor	T4-502	27301067	Network Security, Network Communication Protocols, Human Computer Interaction
Kai-Lung Hua	Professor	T4-511	27301066	Multimedia Big Data, Deep Learning, Computer Vision, Mobile Multimedia Application, Social Media, APP Development
Yu-Chi Lai	Professor	T4-305-1	27303665	Computer Game Technology, Computer Graphics, Physically-based Image Rendering, Computer Animation, Physically-based Simulation, Motion Editing, 3D Model Reconstruction, Computer Vision, Video and Image Editing
Shin-Ming Cheng	Professor	T4-510	27301223	5G/6G Network Security, Internet of Things (IoT) System Security, Malware Analysis, and Artificial Intelligence (AI) Security
Tai-Lin Chin	Professor	T4-504	27301220	Sensor network technology, Wireless Networks, Advanced Telecommunication Technology
Tien-Ruey Hsiang	Associate Professor	T4-513	27301119	Robotics, Wireless Sensor Networks, Computational Geometry
Bi-Ru Dai	Associate Professor	T4-514	27301218	Data Mining, Data Stream Management, Bioinformatics
Yi-Leh Wu	Associate Professor	RB-503-1	27301221	Database System, Data Mining, Geography Information System, Multimedia Database, Image Classification

Name	Position	Office	Tel	Research Area
Chih-Yuan Yao	Associate Professor	T4-305-3	27376936	Computer Graphics, Computer Animation, Mesh Parameterization, Remeshing
Yi-Yu Liu	Associate Professor	T4-305-2	27303664	Electronic design automation and computer aided design, Multi-core computing architecture, FPGA and embedded system designs
Shan-Hsiang Shen	Associate Professor	RB-503	27376413	Software-Defined Networking, Cloud Computing, Content Centric Networking
Kuan-Yu Chen	Associate Professor	T4-508	27376773	Information Retrieval, Summarization, Speech Recognition, Natural Language Processing, Deep Machine Learning
Yi-Ling Chen	Associate Professor	T4-503	27376684	Social Network Analysis, Data Mining, Machine Learning, and Pervasive Computing
Shih-Fan Chou	Assistant Professor	T4-515	27301105	Blockchain Networks, 5G/6G Wireless and Mobile Networks, Broadband Cellular Networks, Performance Modeling and Analysis
Peter Shaojui Wang	Assistant Professor	E1-222-4	27376701	Network Security, Applied Cryptography, Privacy-preserving Data Mining, AI Security, Blockchain
Chia-Chih Lin	Assistant Professor	RB-501	27376326	Physically Unclonable Function design, Hardware Security, Machine Learning, Deep Learning, Internet of Things system

Name	Position	Office	Tel	Research Area
Yi-Han Lien	Assistant Professor	RB-502	27376417	Memory and storage system design; high-performance file system and operating system architecture
Kai-Wen Hsiao	Assistant Professor	T4-507	27301215	Computer Graphics, 3D Modeling and Reconstruction, Generative AI, Extended Reality
Chih-Fan Hsu	Assistant Professor	E1-222-2	27376410	Trustworthy AI Agents, Computer Vision, Machine Learning, Multimedia Systems, Information Security

National Taiwan University of Science and Technology,
Department of Computer Science and Information Engineering
Doctoral Degree Evaluation Criteria

- I. The doctoral degree evaluation committee comprised of 3-5 department instructors with assistant professorship or above invited by the candidate advisor.
- II. Items for evaluation include:
 - 1. Course records
 - 2. Qualification tests records
 - 3. Doctoral thesis draft
 - 4. A thesis with the candidate as the first author accepted and published by an EI or SCI academic journal, and approved by the committee.
 - 5. Doctoral thesis abstract
 - 6. Letter of recommendation from the candidate advisor
 - 7. Resume
 - 8. Professional lecture or thesis presentation at an international conference
- III. Upon a two-third approval by attending committee members, the candidate advisor will apply for a doctoral degree exam committee.
- IV. Details of the doctoral degree exam will be according to university regulations.
- V. The criteria are implemented following approval by department meeting, and amendments will also be as such.

National Taiwan University of Science and Technology,
Department of Computer Science and Information Engineering
Requirements and Procedure for PhD Fast-track Program

- I. The Ph.D fast-track program of CSIE is governed by the “Guideline for Fast-Track Transfer to the Ph.D Program” of Taiwan Tech.
- II. All applications will be reviewed by the curriculum and admission commission of CSIE.
- III. The review process consists of an assessment of the academic records. The weight for academic records is 100% .

National Taiwan University of Science and Technology,
Department of Computer Science and Information Engineering
Doctoral Degree Guidelines

I. Within two years after admission (excluding the period of suspension of schooling), a doctoral student must take and pass a two-stage qualification examination for basic competency assessment and professional competency assessment. Only after the student has passed the examination, the student obtains the qualification of doctoral candidate and is able to continue to pursue the doctoral degree. If the student fails the basic competency assessment or professional competency assessment within the prescribed period, the student must withdraw from school.

II. Basic competency assessment:

1. Basic competencies include four fields as follows:

- (1) Artificial intelligence;
- (2) Multimedia;
- (3) Computer networking and communication; and
- (4) Embedded systems and information security.

A doctoral student is required to pass the assessment in at least two of the above-mentioned fields.

2. To pass the basic competency assessment on a specific field, the student shall submit the application based on the results of the courses the student has completed (not limited to the courses the student has completed after being admitted to the doctoral program). The contents of the applied courses should be similar to those of the courses offered by the System of National Taiwan University (courses offered by the College of Electrical Engineering & Computer Science of NTUST, the College of Electrical Engineering & Computer Science of National Taiwan University, and the College of Science, Technology and Engineering of National Taiwan Normal University). The list of courses included in each field can be found in the supplement below. The contents covered by each course should be subject to the syllabus of the course of the department. One course can only be used for at most one field in the basic competency assessment.

3. One or more fields in the basic competencies can be recognised by published academic papers. The requirements for paper publication are as follows:
 - (1) In the published paper, the doctoral student must be the first author despite of the supervising professor.
 - (2) The submitting date of the paper must be later than the enrollment date of the student for the doctoral program.
 - (3) The paper shall not be counted in passing the threshold of graduation paper publication.
 - (4) The paper must be published in one of journals in Q1, IEEE, ACM or other equivalent grades. The grades of journals are determined by the Academic and Faculty Affairs Committee.
4. Procedure of basic subject competency assessment application is as follows:
 - (1) The assessment is held once every semester. A doctoral student should apply for assessing the subject within the first two weeks of each semester, and submit documents related to the competency assessment, such as course completion certificate, transcript, scores, and ranking.
 - (2) The Academic and Faculty Affairs Committee, composed of faculty members of the department, is responsible for basic competency assessment. The review committee shall be composed of 5 to 7 full-time or program teachers from the department; the head of the department is an ex officio member; and the supervising professor of the applicant must not serve as a member of the review committee. However, the review committee may invite the supervising professor to make explanations as a non-voting attendee if necessary. The review meeting should be held within the first four weeks in each semester. The review is conducted based on the evidence and data provided by the student.
 - (3) The passing criteria for basic competency assessment is a score of 80 (equivalent to A-) or higher grade for each course submitted for the assessment.

III. Professional competency assessment:

1. Oral examination is employed for professional competency assessment. A doctoral student should write a technical report about his/her research results after the applicant has enrolled the doctoral program, and submit it to the oral examination committee. The research results should include

important conference papers, journal papers, and system implementations.

2. For professional competency assessment, the supervising professor of the applicant should convene an oral examination committee composed of 3 to 5 full-time or program teachers from the department to conduct an oral examination based on the research results of the applicant. Any applicant with an average score of 70 or higher in the oral examination pass the assessment.
 3. Professional competency assessment shall be limited to one time.
- IV. These guidelines and any amendment hereto shall be implemented after being adopted by the Faculty Affairs Meeting.

Fields	Subjects
Artificial intelligence	1. Artificial intelligence 2. Data mining 3. Machine learning 4. Data stream mining 5. Algorithm 6. Data structure 7. Numerical computation
Multimedia	1. Computer graphic 2. Computer vision 3. Image processing 4. Human-computer interaction 5. Pattern recognition
Computer networking and communication	1. Computer networking 2. Wireless and mobile networks 3. Network communication protocols 4. Software-defined networking and network function virtualization
Embedded systems, network security, and others	1. Computer architecture 2. Computer organization 3. Embedded systems 4. Real-time operating systems 5. Compiler design 6. Computer-aided design for VLSI system 7. Network security 8. Wireless communication and security 9. Network security technologies and practices 10. Practices of information security 11. Intrusion detection and prevention 12. Information security

Instructions for Selecting a Thesis Advisor for New Graduate Students of the Department of Computer Science and Information Engineering

1. After completing registration, newly admitted students shall consult the contact information (telephone or e-mail) of faculty members available on the department website and refer to the **Faculty Advisor Availability List** announced on the department homepage. Students are responsible for contacting faculty members directly to arrange meetings for discussion prior to selecting a thesis advisor.
2. The thesis advisor must be a full-time faculty member of the Department of Computer Science and Information Engineering. Project-based faculty, adjunct faculty, and faculty from other departments are not eligible to serve as thesis advisors.
3. After selecting a thesis advisor and obtaining a student ID number, students shall log in to the **University Homepage → Current Students → Student Information System → Personal Information → Thesis/Dissertation and Advisor Information System**, complete the required advisor information, and print out the **Thesis/Dissertation Supervision Approval Form**. The form must be signed by both the student and the thesis advisor and be submitted to the Department Office of Computer Science and Information Engineering.
4. After submitting the **Approval Form**, if a student is unable to enroll for any reason, the student must notify both the selected thesis advisor and the Department Office.