

# DATA SCIENCE AND AI

SCHOOL OF ENGINEERING AND TECHNOLOGY  
ASIAN INSTITUTE OF TECHNOLOGY



## Visitors Overview



"THE SEXIEST JOB OF THE 21ST CENTURY"

# Area of Specialization in Data Science and AI

## BACKGROUND

Data science is concerned with the extraction of useful knowledge from data sets. It is closely related to the fields of computer science, mathematics, and statistics. It is a relatively new term for a broad set of skills spanning the more established fields of machine learning, data mining, databases, and visualization, along with their applications in various fields. In 2012, Harvard Business Review called data science "The Sexiest Job of the 21st Century".

Artificial intelligence (AI) is the broad field conceived in 1956 as the automation or simulation of human intelligence. AI has two primary "levels". The first level, "narrow AI", concerns perception, statistical inference, and actuation, drawing on data science, sensors, and robotics. The second level, sometimes called "artificial general intelligence" (AGI), is concerned with more complex or flexible reasoning and decision making in less constrained domains.

It has already begun. In the next 10 years, data science and AI will touch nearly every aspect of human endeavor, transforming the way we live and work. In the longer term, AGI will likely emerge as one of the most disruptive and productive technologies humankind has ever seen.

Are you ready for the age of data science and AI? AIT is ready to help you get abreast of current technology and prepare for the big changes that are coming.

Apply to join AIT's international Master degree specialization in data science and AI today at <https://www.ait.ac.th/admissions/application-form/>



ISE Department

## DS&AI@AIT: THREE STEPS

At AIT, we see data science and artificial intelligence as cross-cutting technologies. Besides expertise in statistics, computation, reasoning, and data manipulation, you need expertise in one or more specific domains.

That is why STEP 1 is to select your Master degree program. We currently offer DS&AI specializations for the following degree programs:

- MS/MEng in Computer Science
- MS/MEng in Information Management
- MS/MEng in Industrial and Manufacturing Engineering
- MS/MEng in Information and Communication Technologies
- MS/MEng in Mechatronics Engineering
- MS/MEng in Microelectronics and Embedded Systems

Once you've selected your degree program, STEP 2 is to plan a year of coursework covering the fundamentals of your field, the fundamentals of data science and AI, and a tailored palette of elective courses. Your AIT academic advisor will be ready to help with this process.

After you've built up skills in the coursework, STEP 3 will be to execute a one-year Master's thesis research project in which you combine your knowledge of your field with your knowledge of data science and AI to solve a new problem. Thesis research is flexible; you may work individually with the guidance of your advisor, in a team, or in cooperation with one of our industrial partners.

That's it! On graduation, your AIT transcript will make special note of your specialization in data science and AI, and your new technical and research skills will leave you confident and ready for the technological disruptions of our data-driven world.



## COURSES

**Machine Learning:** Students learn the data analysis and modeling skills necessary for the engineering of intelligent systems that incorporate models learned from data. Design, training, and testing of supervised, unsupervised, and reinforcement learning models.

**Required for all DS&AI students.**

**Data Modeling and Management:** Students develop skills for analyzing, evaluating, modeling, and developing data-intensive applications incorporating structured, semi-structured, and unstructured data with concern for technical and business requirements such as flexibility, scalability and availability. **Required for all DS&AI students.**

**Big Data Analytics:** Students build skills necessary to create state-of-the-art solutions for real-world large-scale data storage and analysis challenges. The course introduces state of the art frameworks such as Hadoop, Spark, and other tools in the Hadoop ecosystem. **Elective.**

**Business Intelligence:** Students learn to apply technology-driven processes for analyzing data, presenting actionable information to users discovering business insights, and improving business competitiveness. The course introduces BI and data analytics tools and technologies needed to develop BI applications that support major business decisions. **Required for IM+DS&AI students.**

**Natural Language Understanding and Translation:** Students combine linguistic knowledge of natural languages (words, morphology, parts of speech, syntax, and semantics) with algorithms and technologies for processing speech and natural language text. Students learn to apply regular expressions, finite automata, context-free grammars, unification, first-order logic, lambda-notation, hidden Markov models, and rule-based or statistical algorithms to problems of natural language understanding. **Required for CS+DS&AI students.**

**Knowledge Representation and Practical Reasoning:** Students develop skills necessary to apply theories and methodologies for knowledge representation and inference to practical reasoning problems. Model semantics and proof procedures for first-order logic, logic programming, theories of argumentation and Bayesian reasoning, with applications in multiple domains. **Elective.**

**AI and Neuro-Fuzzy Theory:** Students develop skills necessary to apply data-driven AI technologies to engineering problems in robotics and control. Students apply models based on neural networks, fuzzy logic, genetic algorithms, simulated annealing, and particle swarm optimization to real-world problems. **Required for IME+DS&AI, MES+DS &AI, and MT+DS&AI.**

**Data -Driven Operations Research:** Students develop skills necessary to utilize data in the process of formulating, solving, and interpreting models for decision making in industrial settings. Students apply metaheuristic algorithms to help solve large-scale optimization problems incorporating large amounts of data. **Required for IME+DS&AI.**

**Pattern Recognition and Image Processing:** Students develop skills necessary to develop applications that extract and interpret patterns in image data. Students learn to select appropriate image processing and pattern recognition algorithms for a particular problem and incorporate algorithms in to practical applications. **Required for MES+DS&AI and MT+DS&AI.**

**Applied Machine Vision:** Students build skills in the image processing, geometry, statistical inference, and deep learning tools necessary to extract useful information about the world from sequences of two-dimensional images, with applications in robot vision, intelligent monitoring, and human-computer interfaces. **Elective.**

Besides the required DS&AI courses, students must take the required courses for their degree program. Students' options for electives include all of the DS&AI courses plus a wide variety of electives across the School of Engineering and Technology.



## WHY AIT?

AIT's internationally-savvy engineering, technology and management graduates are highly sought after by employers, and command impressive earning potential throughout their careers.

## HOW TO APPLY

STEP 1

Check the eligibility requirements  
<https://www.ait.ac.th/admissions/eligibility/>

STEP 2

Explore scholarships  
<https://www.ait.ac.th/admissions/scholarships/>

STEP 3

Apply online  
<https://www.ait.ac.th/admissions/application-form/>

## SCHOLARSHIPS AND FELLOWSHIPS SUPPORT

Most students at AIT receive partial or full scholarships for study. Partial and full fellowships to defray tuition and fees are awarded competitively to applicants from all countries.

**Thai nationals applying for August admission** may be eligible for a 100% scholarships from the Royal Thai Government, depending on undergraduate performance.

## APPLICATION DEADLINE

The AIT academic year consists of two semesters: January and August. Most students are admitted in August. Scholarships and RTG fellowships are normally only available for the August intake.

Applicants who wish to apply for His Majesty the King's scholarships (very competitive; full tuition support plus stipend) must submit by March 31. Otherwise, applications are accepted on an ongoing basis, but applicants should submit early to be considered for available fellowships. Final deadline for August admission is 30 June, and final deadline for January admission is 15 November.



## FACULTY EXPERTS

Coursework and thesis research is entirely in English and led by the world-class faculty members in the information and Communication Technologies and Industrial Systems Engineering departments at AIT.

### Matthew Dailey (USA)

PhD, University of California, San Diego  
DS&AI Courses: Machine Learning, Applied Machine Vision  
Expertise: Machine Learning, Machine Vision, Robotics, Software Engineering



### Chutiporn Anutariya (Thailand)

PhD, Asian Institute of Technology  
DS&AI Courses: Data Modeling and Management  
Expertise: Databases, Ontologies, Semantic Web



### Vatcharaporn Esichaikul (Thailand)

PhD, Kent State University  
DS&AI Courses: Business Intelligence  
Expertise: Business Intelligence, E-commerce, Information Systems



### Manukid Parnichkun (Thailand)

PhD, University of Tokyo  
DS&AI Courses: AI & Neuro-Fuzzy Theory  
Expertise: Robotics, Control



### Mongkol Ekpanyapong (Thailand)

PhD, Georgia Tech  
DS&AI Courses: Pattern Recognition and Image Processing  
Expertise: Embedded Systems, Machine Learning, Machine Vision



### Phan Minh Dung (Vietnam)

PhD, Dresden University of Technology  
DS&AI Courses: Natural Language Translation and Understanding, Knowledge Representation and Reasoning  
Expertise: AI, Argumentation, Knowledge Representation



### Huynh Trung Luong (Vietnam)

DEng, Asian Institute of Technology  
DS&AI Courses: Data-Driven Operations Research  
Expertise: Statistical Modeling, Supply Chain Optimization



### Apichon Witayangkurn (Thailand)

DEng, University of Tokyo  
DS&AI Course: Big Data Analytics  
Expertise: Big Data, Software Engineering, Remote Sensing



**ICT Department (CS, IM, and ICT programs)**  
**ISE Department (IME, MT and MES Programs)**

P.O.Box 4, 58 M.9, Km.42, Paholyothin Highway, Klong Luang, Pathumthani 12120, Thailand  
Please call: +662-5245700, 5245717, 5246601, 5246606  
Email: siripornn@ait.ac.th, sireekant@ait.ac.th