AI + COMPUTER ENGINEERING

STUDENT HANDBOOK

# Master of Science in Artificial Intelligence and Computer Engineering

M.S. in AiCE

# Master of Science in Artificial Intelligence and Computer Engineering

***Student Handbook***
***(M.S. in AiCE)***

CMKL University
Bangkok, Thailand

Effective: August 3, 2026

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This current version is effective as of August 3, 2026.

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# Welcome to the Era of Artificial Intelligence

Artificial intelligence has moved from the research laboratory to the center of economic and institutional life. Every industry—manufacturing, agriculture, finance, healthcare, media & entertainment—now faces the same dual challenge: how to adapt AI meaningfully to its own context, and how to do so at a moment when the technology itself is still being invented. Neither challenge can be met by treating AI as a finished product to be procured. Both demand people who can operate on the technology, not merely with it.

The AI and Computer Engineering (AiCE) graduate program at CMKL University was built for exactly this dual mandate. On one axis, our students engage with industry—studying real deployment problems, working with partner organizations, and learning that the hardest questions in applied AI are rarely algorithmic: they concern data, infrastructure, integration, economics, and trust. On the other axis, the program advances the technology itself. AiCE research spans the full stack—from silicon and compute infrastructure through foundation models, systems software, and applications—because durable capability in AI requires depth at every layer, not just fluency at the surface.

This vertical scope reflects a conviction: nations and industries that only consume AI will be shaped by it; those that can build and adapt it will shape their own futures. Graduate education is where that capacity is formed. Our students do not simply complete coursework—they contribute to research programs, industry deployments, and infrastructure that matter beyond the university.

AiCE is also deliberately a platform, not an enclave. Our program connects students to a global network of academic collaborators, technology providers, and enterprise partners. Our industry consortium brings real problems and real data into the curriculum; our technology partnerships give students access to state-of-the-art compute, tooling, and engineering practice; our international linkages ensure that work done here is measured against the global frontier. Students graduate not only with technical depth, but with a working network spanning the organizations that are building and deploying AI worldwide.

This handbook describes the structure, expectations, and opportunities of the program. But its underlying premise is simple: the coming decade will be defined by those who can both advance AI technology and translate it into consequence. We built AiCE to produce those people.

Sincerely,

**Akkarit Sangpetch, PhD**
AiCE Program Director
CMKL University

# 1. Brief Overview of Program

Our mission is to foster the development of talented engineers and researchers who are ready for the next wave of digital disruption. Throughout the program, our students will explore how to apply AI techniques to major aspects of computing, including human-centric design and visualization, scalable and distributed computing systems, privacy and security. Students will learn through hands-on experience, working alongside our engineers and designers to solve the real-world problems of our industrial partners. Technical deep dive is also provided by working with our international teams of researchers and faculty members from leading universities.

## 1.1 Mission

Nurture talent and revolutionize industries to become leaders through a synergistic approach of knowledge, technology, research, and innovation.

## 1.2 Vision

Transform education to cultivate entrepreneurial professionals and revolutionize collaborative research and development.

## 1.3 Value

Push boundaries, bring ideas to life, make a meaningful impact on industry and society

## 1.4 Program Educational Objectives

Our program educational objectives are as follows. The objectives represent our vision for what our graduates will be doing in their careers five years after graduation.

- **Engineering Experts:** Our graduates will be able to solve problems by applying engineering fundamentals. Their solutions will reflect the depth and understanding of technology, drawing upon multiple disciplines and considerations for the problem.
- **Entrepreneurial Innovators:** Our graduates will demonstrate creativity in their engineering practice. They will be able to consider a system-oriented approach in their design. They will be able to strategically plan and execute successful engineering projects in their own businesses or organizations.
- **Ethical Leaders:** Our graduates will take initiative, demonstrating their resourcefulness and ability to collaborate in diverse and multidisciplinary teams. They will also be leaders in their organizations or professions while being aware of potential economic and societal impacts of their actions.

# 2. Introduction

## 2.1 Degrees Offered

Graduates of the M.S.in AiCE program will earn a degree from CMKL University. Students will be supervised by faculty advisors from CMKL University who will help them to create and define research projects to complete in pursuit of their degree. The advisors will also assist with selection of learning activities and other elements of the M.S.in AiCE program based on the student's background and academic goals.

## 2.2 Graduate Student Handbook

This handbook is intended to set guidelines and expectations for new and current Master's students in Artificial Intelligence and Computer Engineering at CMKL University. This handbook is not exhaustive and will be subject to revision from time to time.

It is the responsibility of each student to read and understand the contents of this handbook.

This handbook, along with any revisions, will be posted and announced annually on the university website.

## 2.3 CMKL University Statement of Equal Access

CMKL University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Additionally, CMKL University adheres to non-discrimination policies set forth in Thai national laws and executive orders.

Inquiries concerning the application of and compliance with this statement should be directed to the Vice President for Campus Affairs, CMKL University, 1 Soi Chalongkrung 1, Ladkrabang, Bangkok 10520, Thailand. Obtain general information about CMKL University by calling +66 65 878 5000.

# 3. Faculty Information

Throughout their time in the M.S. in AiCE program, students will encounter a variety of faculty and staff members who will help them on their way to completing their degree. For more details about faculty backgrounds and specialties, please visit the university website.

## 3.1 Course Instructors

**Supan Tungjitkusolmun**
Associate Professor, CMKL University
B.S., Electrical and Electronics Engineering, University of Pennsylvania, USA
M.S., Electrical Engineering, University of Wisconsin, USA
Ph.D., Electrical Engineering, University of Wisconsin, USA

**Orathai Sangpetch**
Assistant Professor, CMKL University
B.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
M.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
Ph.D., Electrical and Computer Engineering, Carnegie Mellon University, USA

**Akkarit Sangpetch**
Program Director, CMKL University
Director, AI Engineering Institute
B.S., Computer Science, Carnegie Mellon University, USA
B.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
M.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
Ph.D., Electrical and Computer Engineering, Carnegie Mellon University, USA

**Sally Goldin**
Assistant Professor, CMKL University
Associate Director of Learning Innovation, CMKL University
B.A., Cognitive Psychology, Brown University, USA
M.A., Cognitive Psychology, Brown University, USA
M.S., Cognitive Psychology, Carnegie Mellon University, USA
Ph.D., Cognitive Psychology, Carnegie Mellon University, USA

**Charnon Pattiyanon**
Assistant Professor, CMKL University
B.S., Computer Engineering (International Program), King Mongkut's University of Technology Thonburi, Thailand
M.S., Software Engineering, Chulalongkorn University, Thailand
Ph.D., Information Science, Japan Advanced Institute of Science and Technology (JAIST), Japan

**Fawad Asadi**
Assistant Professor, CMKL University
B.Eng., Electrical Engineering, Taibah University, Saudi Arabia
D.Eng., Biomedical Engineering and Artificial Intelligence, Rangsit University, Thailand

**Irving Gómez Méndez**
Assistant Professor, CMKL University
B.Sc., Mathematical Engineering, Instituto Politecnico Nacional, Mexico
M.Sc., Probability and Statistics, Centro de Investigacion en Matematicas, Mexico
Ph.D., Probability and Statistics, Centro de Investigacion en Matematicas, Mexico

**Pisut Wisessing**
Assistant Professor, CMKL University
B.A., Physics and Mathematics, Cornell University, USA
MFA., Digital Production Arts, Clemson University, USA
Ph.D., Computer Science, Trinity College Dublin, Ireland

**Sarun Gulyanon**
Assistant Professor, CMKL University
B.Sc., Computer Science, University of Edinburgh, UK
M.S., Computer and Information Science, Purdue University, USA
Ph.D., Computer Science, Purdue University, USA

**Dylan Powell**
Instructor, CMKL University
B.A. (Hons)., Product Design, De Montfort University, Leicester. UK
M.Sc., Managing Innovation in Creative Organisations, Loughborough University, UK

**Justin Paulsen**
Assistant Professor, CMKL University
B.S., Marketing, Marist College, USA
B.S., Finance, Marist College, USA
MBA, International Business, Bryant University, USA

**Lorenzo Avi**
Assistant Professor, CMKL University
Typography and Graphic Design, Ecole Nationale d'Etudes Superieure de la Cambre, Belgium
M.A., Interior Architecture, Académie Royale des Beaux-Arts de Bruxelles, Belgium

**Natnatee Dokmai**
Assistant Professor, CMKL University
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Ph.D., Computer Science, Indiana University, USA

**Antoine Merlet**
Assistant Professor, CMKL University
M.A., Medical Imaging, Erasmus Mundus Joint Master Degree in Medical Imaging and Applications (MAIA), University of Girona, Spain & University of Cassino and Southern Lazio, Italy
Ph.D., Computer Engineering, Automation and Signal Processing, SATT SAYENS–Université Bourgogne, France

**Etienne Mueller**
Assistant Professor, CMKL University
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M.S., Product Development, Materials and Production, Technical University of Hamburg, Germany
Ph.D., Computer Science, Technical University of Munich, Germany

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Instructor, CMKL University
B.A., Mathematics, Economics, University of Virginia, USA
M. Entrepreneurship, University of Michigan at Ann Arbor, USA

**Supawit Chockshowwat**
Assistant Professor, CMKL University
B.S., Turing Scholars Honors in Computer Science, University of Texas at Austin, USA
Ph.D., Computer Science, University of Illinois Urbana-Champaign, USA

**Panarat Cherntanomwong**
Assistant Professor, Department of Computer Engineering, KMITL
Associate Dean of Global Partnerships, CMKL University
B.Eng., Telecommunication Engineering, KMITL, Thailand
M. Eng., Electrical Engineering, KMITL, Thailand
D.Eng., International Development Engineering, Tokyo Institute of Technology, Japan

**Raveekiat Singhaphandu**
Assistant Professor, CMKL University
B.S., Computer Science, Sirindhorn International Institute of Technology, Thammasat University, Thailand
M.S., Informatics, Technical University of Munich, Germany
Ph.D., Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, Thailand
Ph.D., Knowledge Science, Japan Advanced Institute of Science and Technology, Japan

**Pakpoom Buabthong**
Adjunct Faculty, CMKL University
B.Sc., Physics, University of Illinois Urbana-Champaign, USA
Ph.D., Materials Sciences, California Institute of Technology, USA

**Sooksan Panichpapiboon**
Professor, School of Information Technology, KMITL
Adjunct Faculty, CMKL University
B.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
M.S., Electrical and Computer Engineering, Carnegie Mellon University, USA
Ph.D., Electrical and Computer Engineering, Carnegie Mellon University, USA

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B.S., Economics, Massachusetts Institute of Technology, USA
M.S., Economics, Northwestern University, USA
Dr. Phil.(magna cum laude), Economics, Gottfried Wilhelm Leibniz Universität Hannover, Germany

**Rubkwan Choldumrongkul**
Adjunct Faculty, CMKL University
LL.B.,Faculty of Law, Chulalongkorn University, Thailand
LL.M., Banking and Financial Regulations, University College London, UK

**Paneak Warawit**
Adjunct Faculty, CMKL University
B.Eng., Electronics Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand
M.Sc., Management Information Systems in Business, Chulalongkorn University, Thailand

**Chaiyong Ragkhitwetsagul**
Assistant Professor,Faculty of Information technology, Mehidol University
Adjunct Faculty, CMKL University
B.Eng., Computer Engineering (Magna Cum Laude), Kasetsart University, Thailand
M.S., Information Technology (Very Large Information Systems), Carnegie Mellon University,USA
Ph.D., Computer Science (Software Engineering), University College London, UK

# 4. Pre-Matriculation

## 4.1 Admissions Policies

Admission criteria for the M.S. in AiCE Program are designed to reflect our core values and program outcome. We consider collaboration, perseverance, passion, advocacy for others and self-direction when making admission decisions. We are interested in students who can be successful at CMKL while fully engaging in the university community and our extended ecosystem.

For information about AiCE's admission policies, including application requirements, application deadlines, links to the application forms, please visit the university webpage: `www.cmkl.ac.th/admissions`.

## 4.2 English Language Proficiency Test

All learning activities in the AiCE program are conducted in English. Therefore, all prospective students must demonstrate English proficiency. Specifically, all applicants whose native language is not English must take an English Language proficiency test. Native language is defined as a first language, or language spoken from birth. The test scores must be submitted by the application deadline for the semester in which students are applying.

CMKL accepts TOEFL, IELTS, and Duolingo English Test as evidence of English language proficiency. Please refer to the admissions website for the requirements of each test.

## 4.3 Final Transcripts

As a condition of enrollment at CMKL university, applicants admitted to the AiCE program must submit final official transcripts, properly sealed, upon completion of their undergraduate program from the institution conferring their degree as a condition of enrollment at CMKL University. Certificates of graduation and/or degree certificates or equivalent should also be submitted if provided by the institution. Failure to provide such documents that confirm the completion of graduation requirements by the end of the first semester of study at CMKL University may prevent the M.S. in AiCE degree from being certified.

# 5. Enrollment and Registration

## 5.1 Degree Progress and Planning Overview

After matriculating into M.S. in AiCE, students should create an academic plan and register for courses. Students should actively engage in their process by reviewing degree requirements on the website, connecting with their academic advisor, and conferring with a faculty mentor.

Once a schedule is developed, it is the student's responsibility to register for courses via `cube.cmkl.ac.th` Students must be registered for every course that they plan to take for the semester, even if it is not taken for credit (e.g., audited courses). After the first semester, a student's assigned registration time is determined by the number of completed units and cannot be changed.

## 5.2 Student Responsibility

It is the student's exclusive obligation to manage their program's academic development. Students are expected to take the appropriate prerequisites and courses in order to satisfy degree requirements on time. Students can add and remove courses, as well as select units for variable unit courses. It is the obligation of the students to be aware of all academic deadlines, including the add and drop dates. Academic deadline information can be obtained on each semester's academic calendar, which can be found at `www.cmkl.ac.th/students`.

If a student is not making the required progress, they should seek advice and counsel from their academic advisor. If a student is concerned about their ability to complete degree requirements, they should consult with their advisor for assistance.

## 5.3 Degree Requirements Timeframe

AiCE adheres to the official CMKL University Calendar, which can be found at `www.cmkl.ac.th/students`.

The M.S. in AiCE program lasts three full-time semesters (1.5 year program). To maintain full-time status as a student at CMKL, students must enroll in at least 36 units per semester. The maximum number of units permitted in a semester is 48.

Each semester, students are responsible for completing their enrollment. Students who do not register by the tenth day of class will be dropped from the university.

Students are encouraged to be physically present at the beginning of the semester to participate in learning activities and meet their peers and adviser. Failure to attend class from the start of the semester will have a negative impact on a student's progress in the program.

## 5.4 Full-time Requirements

The M.S. degree program is a full-time program with three full-time semesters. To maintain a full-time status, students need to be enrolled in at least 36 units during the semester. During their stay in Thailand, the student must enroll in M.S. graduate projects or research courses, as well as participate in ongoing university-partner collaborations.

## 5.5 Maximum Units Allowed

While pursuing your degree at CMKL, you should not take more than 144 units (maximum 48 units per semester). If it becomes obvious that a student will surpass the maximum number of units and will be unable to maintain the required 3.0 grade point average, the student may be dropped from the M.S. in AiCE program.

## 5.6 Retaking Courses

If students fail a course, they should take another course to meet the requirement. Retaking a course is not advised. All grades are recorded on the transcript and count toward the cumulative QPA;

however, only the best 96 units that complete degree requirements count toward the needed 3.0 graduation QPA.

## 5.7 Auditing Courses

Auditing a course means attending a class but not obtaining academic credit or a letter grade. A course that has been audited will show on a student's transcript. Students who are present in a classroom but are not receiving academic credit or a letter grade must audit the class in order to continue attending on a regular basis. Students who want to audit a course must do the following:

1. Sign up for the course.
2. Obtain permission from the instructor and have them sign the course audit approval form.
3. Submit the form for clearance to their academic advisor.
4. If authorized, the form will be sent to the academic adviser for processing.

After submitting a course audit permission form, no letter grade ('A'-'R') will be issued to the course, and the declaration cannot be overturned. The deadline for submitting this form can be found on the Academic Calendar. Students will not be allowed to request the option to audit a course after the deadline.

The course instructor must arrange and authorize the extent of the student's participation. Auditors are typically expected to attend class as if they were normal class members. Those who do not attend class on a regular basis or prepare for class will not receive a grade. Otherwise, the student obtains an audit grade of 'O.'

Audited course units count toward the maximum course load units but not toward degree requirements. A course may be audited by any student. An audited course is billed in the same way as ordinary courses under tuition rates.

## 5.8 Pass/No Pass Courses

Auditing a course means attending a class but not obtaining academic credit or a letter grade. Students who wish to take a pass/fail course must register for it and submit a pass/no pass approval form to their academic advisor for approval. If approved, the form will be sent to the academic adviser for processing.

After submitting a Pass/Fail Audit Approval form, no letter grade ('A'-'R') will be issued to the course, and the declaration cannot be overturned. Passing work (letter grades 'A'-'C') is recorded on the student's academic record as 'P' (passing grade) or 'S' (satisfactory), with both grades meaning the same; work with a grade of 'C-' or lower will not receive credit and will be recorded as 'N' (not passing grade) on the student's academic record. No quality points will be granted to 'P'/'S' or 'N' grades, and their units will not be counted into the student's QPA.

Pass/no pass courses count toward the maximum course load units but not toward the degree requirements. The deadline for submitting this form can be found on the Academic Calendar. Students will not be allowed to request the option to pass/fail a course beyond the deadline.

# 6. Registering for Courses

## 6.1 Course Load

Students are advised to take 36 units of coursework each semester due to the intensity of the program. We acknowledge, however, that our student body is unique, and this includes how each student manages their course load. Students may register for the maximum units per semester. Students who are uncertain whether they should take 48 units should meet with their academic advisor to discuss and to develop a plan to carefully manage their time during that semester.

## 6.2 Adding Courses

Students can add courses to their calendar beginning at their allocated registration time and continuing until the add/drop deadline. If students want to be added to a course after the add/drop deadline, they must fill out the Course Add Request Form and have it signed by the course instructor. The paperwork must then be submitted to the students' academic advisor and CUBE for approval.

## 6.3 Course Locations

Courses will take place at various buildings and room locations across CMKL University as assigned in each academic semester. Please refer to the course schedule and detail on the course syllabus.

## 6.4 Dropping Courses

Students can drop courses from their schedule beginning at their allocated registration time and continuing until the add/drop deadline. When you drop a course before the drop deadline, it does not appear on your transcript. As a courtesy to others, students should drop a course as soon as they decide not to take it. This allows a waitlisted student to enroll while minimizing disturbance to any team-based tasks.

## 6.5 Withdrawing from Courses

Each semester, students should drop a course before the drop deadline. If a student wishes to withdraw from a course after the drop deadline, the student must do so in writing and should check with their advisor. To withdraw from a course after the drop deadline but before the end of the semester, students must complete and submit the Course Withdrawal Request signed by their academic advisor and send to CUBE for processing. Withdrawals receive a "W" grade on their record; this "W" grade is not counted into the QPA, but the course units count towards the maximum units.

## 6.6 Courses with Time Conflicts

In general, students are not permitted to enroll for two courses that are scheduled at the same time. Registration may be possible with the permission of the instructor, allowing for a conflict or attendance at a different time. In order to register for conflicting courses, students must receive permissions from the instructors and notify their academic advisor of their decision.

### 6.7 Prerequisites

While the university may enable you to register for courses without having finished a listed prerequisite course, it is the duty of the student to have appropriate background knowledge to be successful in the succeeding course. This prior knowledge could be from a CMKL introductory course, your undergraduate university, or other work/research experience. Students should check with the instructors as it is up to them if prerequisite courses can be waived or whether it is possible for students to catch up with the content throughout the semester through self-study.

### 6.8 Final Exams

Any final exams or other final evaluation activities organized by individual course instructors must be attended by all AiCE students. Students must directly communicate with the instructor if there is a potential time conflict with another course. Attendance at the final evaluation activity is ultimately the student's responsibility. Please bear this in mind while planning final-semester travel; purchasing airline tickets is not an acceptable reason for skipping a final exam.

## 7. Research Assistant & Teaching Assistant Positions

### 7.1 Research Assistant for Pay

Students may pursue paid research opportunities in any department/program. Students should contact faculty members individually to enquire about possible opportunities and offer background information. More information on payroll procedures can be obtained from the supervising faculty.

### 7.2 Teaching Assistant Positions

Teaching assistant positions are available at various levels for AiCE students. Please seek guidance and counsel from the academic adviser for detailed information.

## 8. Enrollment and Degree Certification

### 8.1 Enrollment Verifications

The CUBE Office (`https://cube.cmkl.ac.th`) is the main point of contact for students and alumni who need a transcript, enrollment verification, or other information about their experience in AiCE.

AiCE may give a letter to verify some limited information, which may be appropriate for specific purposes, such as confirming skills students gained through the AiCE program. For more information, please contact your academic advisor.

## 8.2 Leave of Absence

Students may need to take a break from their studies for a variety of reasons (financial, academic or personal). Students who wish to take a leave of absence must first consult with their adviser to discuss their goals while away and to iron out any conditions that may be required for a successful return to CMKL.

A student may depart CMKL by either withdrawing from the university (leaving with no intention of returning) or taking a leave of absence (leaving the university temporarily, with the firm and stated intention of returning). All students requesting a leave of absence must fill out a Leave of Absence Form. Going on Leave of Absence does incur a fee to maintain student's records and technological services. All students who are withdrawing must complete a Withdrawal Form. Notifying instructors or no longer attending classes does not complete the process.

The CUBE website has forms available. Tuition will be charged to the midway of the semester or the last date the student attended an academically related activity such as an exam, tutorial, or study group, or the final day a student turned in a class assignment if the leave form is not completed.

## 8.3 Returning from a Leave of Absence

Students on leave who want to return to CMKL to finish their degree can do so under certain conditions. Students must complete the Return from Leave of Absence form signed by their academic advisor and file to CUBE for processing. Students must clearly state their intended semester of return. The form must be submitted at least one month prior to the start of the intended semester of return. Graduate students are eligible to return to the AiCE program within two years. Students who return after two years are subject to space limits and an academic performance review.

Students on leave are not able to live in university accommodation, attend classes, or work as students at CMKL while their leave is in force, according to the university policy.

It should also be noted that international students who take a leave of absence will lose their Educational Visa and will have to leave Thailand.

## 8.4 All-But-Dissertation Status

Thesis track students can opt for All-But-Dissertation (ABD) status once they have completed all their required course credits but have not yet submitted and defended their thesis. To be eligible for ABD status, students must complete three full-time semesters and receive passing grades for all required coursework. ABD semesters adhere to the CMKL academic calendar. While on ABD status, the students are required to pay a nominal fee to maintain ABD status.

## 8.5 Degree Certification Process and Commencement

Students will be awarded a *Master of Science in Artificial Intelligence and Computer Engineering* degree.

To be eligible for degree certification, students must fulfill all degree requirements and record a minimum of 3.0 QPA in the courses applied toward the needed 96 units from CMKL and pass thesis defense for thesis track students. In addition, to receive their degree, students must have no out-

standing balance in their CMKL tuition account. Students must submit the request to graduate form to CUBE for final degree requirement verification at the start of the intended semester of graduation. CMKL Commencement occurs only once a year. Students who satisfy the degree requirement after the annual event will be invited to the following commencement ceremony.

Before graduating, students should update their contact information with CUBE, such as their mailing address and email address. Students should also double-check the information displayed on the student account, such as the spelling of their name, to ensure correct information on their degree certificate.

# 9. Academic Standards

## 9.1 Grades

Below are the policies surrounding grades for students in M.S. in the AiCE program.

### University Policy on Grades

The university policy on grading offers details concerning university grading principles for students studying in the program and covers the specifics of assigning and changing grades, grading options, drop/withdrawals and course repeats. It also defines the graduate standards.

### Grading Policy

AiCE follows the following letter grade scale. The letter grade scale is 'A' (highest), 'A-', 'B+', 'B', 'B-', 'C+', 'C', 'C-', 'D+', 'D', and 'R' (lowest). Grades lower than 'C', meaning C- or below, are considered failure in AiCE and will not count toward degree requirements.

## 9.2 Academic Performance

### Quality Points Average

In order to graduate, each student must have a Quality Point Average (QPA) of at least 3.0 in the courses being used towards the required 96 units. Coursework or graduate project units with a grade lower than 'C' will not be considered toward graduate degree requirements. However, they will be calculated into the student's cumulative QPA.

### Academic Probation

In the event that a student's semester or cumulative QPA falls below a 3.0, that student will be considered to be on academic probation and will receive a letter from the department alerting them. While on probation, students must meet with their academic advisor and comply with their recommendations. Once a student's semester and cumulative QPA increase above 3.0, the student is automatically removed from probation.

## 9.3 Academic Integrity

Students at CMKL are engaged in preparation for professional activity of the highest standards. Each profession constrains its members with both ethical responsibilities and disciplinary limits. To assure the validity of the learning experience a university establishes clear standards for student work.

AiCE adheres to CMKL's policies on academic integrity and all students are expected to review these policies prior to their arrival at CMKL.

In any presentation, creative, artistic, or research, it is the ethical responsibility of each student to identify the conceptual sources of the work submitted. Failure to do so is dishonest and is the basis for a charge of cheating or plagiarism, which is subject to disciplinary action.

The active learning focus of the AiCE program places even more stringent demands on students' integrity. Since students will demonstrate mastery largely via creation of designs, programs, and systems, the student will need to rely on external sources and information. It is critical that students identify what work is their own and what work is derived from other sources. Furthermore, students must adhere to instructors' guidelines regarding what types of external sources are permitted

Finally, some work at CMKL will be done in teams, while other work will be individual. Students should note that an individual assignment must be solely their own work. Copying of any sort on an individual assignment is a violation of ethical standards and will be subject to severe penalties.

**Penalties for Violating Academic Integrity**

Instructors are responsible for defining academic integrity for students in their courses, including student performance expectations and attendance requirements. Students are responsible for understanding and abiding by the instructor's academic integrity policies. Policies may vary from instructor to instructor and students should seek further guidance from a faculty member if they have specific questions about a course's academic integrity policy.

Should an instructor believe that an academic integrity violation has occurred, he or she may consult with the Office of the Dean of Student Affairs, who will assist the faculty member in handling a possible academic integrity violation and, if a student is found responsible for violating academic integrity policies, determining possible sanctions. Sanctions may include being required to redo work, losing credit and/or public admissions of guilt.

If a student is found to have violated the academic integrity policy for a second time, the student will be dropped from the AiCE program at the end of the semester in which the infraction has occurred.

Students have the right to appeal an academic integrity decision.

# 10. M.S. AiCE DEGREE REQUIREMENTS

AiCE students must satisfy multiple requirements before the Master of Science degree is awarded.

The M.S. in AiCE is a three-semester program that is offered with four study tracks: professional track, thesis track, entrepreneurial track, and AI innovation track. Students will have to choose between one of the tracks and follow the track requirements. The requirements for each track are described below.

## 10.1 Professional Track (96 units)

The Professional Track is designed for students seeking advanced coursework breadth with applied research and innovation.

| Category | Units |
|---|---|
| Core Courses | 60 units |
| Electives | 24 units |
| Research, Entrepreneurship & Innovation (REI) | 12 units |

***Core Courses (60 units):*** *Students select core engineering courses offered by the Artificial Intelligence and Computer Engineering Program (course codes starting with 41-XXX) or the Electrical and Computer Engineering Program (course codes starting with 18-XXX).*

***Electives (24 units):*** *Students can choose elective courses across approved disciplines (course codes starting with 18-XXX, 41-XXX, 42-XXX, or 56-XXX).*

***Research, Entrepreneurship & Innovation (12 units):*** *Through CMKL 41-900, students engage in real-world, collaborative projects with university and industry partners to develop essential leadership and problem-solving capabilities.*

## 10.2 Thesis Track (96 units)

The Thesis Track is ideally suited for students aiming to pursue academic careers, doctoral studies, or advanced research and development roles.

| Requirement | Units |
|---|---|
| Core Courses | 24 units |
| Electives | 12 units |
| Research, Entrepreneurship & Innovation (REI) | 12 units |
| Research & Development | 48 units |
| Thesis Defense | Required** |

***Core Courses (24 units):*** *Students select core engineering courses offered by the Artificial Intelligence and Computer Engineering Program (course codes starting with 41-XXX) or the Electrical and Computer Engineering Program (course codes starting with 18-XXX).*

***Electives (12 units):*** *Students can choose elective courses across approved disciplines (course codes starting with 18-XXX, 41-XXX, 42-XXX, or 56-XXX).*

***Research, Entrepreneurship & Innovation (12 units):*** *Through CMKL 41-900, students engage in real-world, collaborative projects with university and industry partners to build leadership and problem-solving capabilities.*

***Research & Development (48 units):*** *Under CMKL 41-910, students dedicate focused units to their specialized thesis research under the guidance of a faculty advisor.*

**Thesis Defense**

To successfully graduate, students must complete the following milestones:

- Submit the Master's Thesis Defense Request form and the completed thesis manuscript to `graduate@cmkl.ac.th` at least one month prior to the end of the semester of thesis defense.
- Present and defend their thesis in front of a panel of three committee members. The primary advisor will nominate a committee member, while the program will appoint the third committee member. The last day to complete the thesis defense is the last day of the final exam for the intended semester of graduation.
- If there is any revision required to the thesis, it must be submitted and approved before the last day of the semester.
- The thesis defense will be available for other members of the university to observe.
- The thesis book will be published in the university repository.

## 10.3 Entrepreneurial Track (96 units)

The Entrepreneurial Track is designed for aspiring entrepreneurs focused on launching technology-driven ventures and commercializing AI solutions.

| Requirement | Units |
|---|---|
| Core Courses | 24 units |
| Electives | 24 units |
| Business Intelligence | 12 units |
| Capstone Projects | 36 units |
| Venture Assessment | Required** |

***Core Courses (24 units):*** *Students select core engineering courses offered by the Artificial Intelligence and Computer Engineering Program (course codes starting with 41-XXX) or the Electrical and Computer Engineering Program (course codes starting with 18-XXX).*

***Electives (24 units):*** *Students can choose elective courses across approved disciplines (course codes starting with 18-XXX, 41-XXX, 42-XXX, or 56-XXX).*

***Business Intelligence (12 units):*** *Focuses on foundational business and market insights required for technology ventures.*

***Capstone Projects (36 units):*** *Under this project framework, students develop, test, and validate a Minimum Viable Product (MVP) in close collaboration with industry experts, academic faculty, and startup mentors.*

**Venture Assessment**

To successfully graduate, students must complete the following milestones:

- Submit formal venture documentation and a business pitch deck to `graduate@cmkl.ac.th`.

- Present and defend a viable MVP to the Startup Studio Panel.
- Complete all required venture or product revisions before the final semester deadline.
- MVP pitch sessions are open to the university community for observation.

## 10.4 AI Innovation Track (96 units)

The AI Innovation Track is tailored for students who want to combine deep engineering expertise with hands-on innovation practice, focusing on building and shipping cutting-edge AI products.

| Requirement | Units |
|---|---|
| Core Courses | 24 units |
| Innovation Courses | 12 units |
| Electives | 48 units |
| Innovation Project | 12 units |

***Core Courses (24 units):*** *Students select core engineering courses offered by the Artificial Intelligence and Computer Engineering Program (course codes starting with 41-XXX) or the Electrical and Computer Engineering Program (course codes starting with 18-XXX).*

***Innovation Courses (12 units):*** *Students take specialized innovation and product development coursework under the 42-XXX designator.*

***Electives (48 units):*** *Students can choose elective courses across approved disciplines (course codes starting with 18-XXX, 41-XXX, 42-XXX, or 56-XXX).*

***Innovation Project (12 units):*** *Through CMKL 42-900, students engage in a hands-on project dedicated to designing, building, and deploying real-world AI applications.*

## 10.5 Integrated B.Eng. in AiCE

The Integrated Master's/Bachelor's program (IMB program) allows students who excel academically as bachelor's degree students to achieve both a Bachelor's and Master's degree in AiCE through our M.S. degree program without needing to apply separately. This means no application fee, no recommendation letters, and no need to take the GRE (Graduate Record Exam).

Eligible students begin by completing their B.Eng degree in AiCE, and can either complete the M.S. degree at the same time or over the next few semesters. If a course is eligible for the M.S. degree but must be used to complete the B.Eng. degree, then the B.Eng. degree takes priority over the M.S. degree. If suitable progress towards completing the B.Eng. is not made, the M.S. cannot be granted regardless of whether a student fulfills all M.S. graduation requirements. B.Eng. students must complete their degree requirements and graduate before they can be classified as a full-time graduate student. Some courses will require graduate student status before a student can register for them. In the case of M.S. research projects, an IMB student can only register for the graduate version in their senior year and with written approval from their research instructor confirming the work is at an appropriate rigor for M.S. students.

### Eligibility and Admission

Undergraduate AiCE students with a 3.00 QPA or above automatically become eligible for the IMB program in the second semester of their junior year once they have completed at least 270 units. To

be officially admitted, students must attend an IMB info session and sign a declaration form. IMB info sessions are offered twice per semester and all juniors and seniors receive an email in the first few weeks of classes with that semester's dates. Students who meet all requirements for the IMB program can sign up at the session. The deadline to sign up for the IMB program for students who meet all requirements is the end of November for the fall semester and the end of April for the spring semester.

Undergraduate students with a 2.50 to 2.99 QPA may petition to enter the IMB program in their final semester. These students must get the approval of their undergraduate advisor, as well as attending an IMB information session. Students in this situation should obtain a petition form from their undergraduate advisor, complete this form, and submit to their advisor by October 31st in the fall semester and March 31st in the spring semester. To obtain the petition form, students can contact their undergraduate academic advisor.

Students with below a 2.5 QPA are not eligible for the IMB program.

### Degree requirements

The graduate level requirements for the integrated B.Eng. and M.S. degree are the same as for the M.S. degree. For students in the AiCE IMB program, all requirements for the M.S. degree are in addition to the requirements for the B.Eng. in AiCE. No requirements for the M.S. degree may be used in any way toward the B.Eng. degree.

Students will be committed to the M.S. curriculum requirements that exist at the time that they sign their declaration form.

Once a student in the IMB program has completed all the requirements for the B.Eng. degree, they may become a graduate (Master's) student. To do this, the student's undergraduate degree is certified, and that student officially graduates with the B.Eng. degree. Once a student's undergraduate degree has been certified, no more courses may then be applied toward the B.Eng. degree.

If a student takes more than eight semesters to complete both the B.Eng. and MS degrees, then they must be a graduate student for at least one semester before graduating.

To determine the most appropriate time to transition to graduate student status, an undergraduate student should consult with CUBE to consider financial aid implications and with their academic advisor to plan their course schedule.

### IMB for External University Students

In addition to CMKL undergraduate students, the Integrated B.Eng./M.S. (IMB) pathway is also open to eligible third-year undergraduate students from other universities. Applicants should follow the standard application process for the M.S. in AiCE program via the university's admissions portal: `https://apply.cmkl.ac.th/`.

To be considered, applicants must:

- Be in their junior or senior year of undergraduate study.
- Complete all required fields in the application form in full.
- Meet the academic and program requirements outlined for the M.S. in AiCE.

If the application meets the program's requirements, the admissions team will contact the applicant regarding next steps.

Financial aid is available to eligible applicants.

Applicants who have lived in a country where English is the native language are not required to submit an English proficiency test.

# 11. EXCHANGE AND TRANSFER PROGRAMS

## Internship Course Option

AiCE students may wish to participate in paid internships at off-campus organizations in Thailand during the summer months. AiCE will enroll all students who are pursuing an internship for a 3-unit credit bearing internship course (CMKL 41-995 Internship for Graduate Students), which can be taken once throughout the student's AiCE M.S. degree program of study and is offered only during the summer. This internship will appear on a student's CMKL transcript and tuition will be charged for 3 units. The work for the internship must be appropriate to the goals of the academic program.

## University Credit Transfer and Student Exchange Programs

Current AiCE students taking courses at other accredited institutions (colleges and universities), as part of exchange programs or other departmentally approved programs, or while on leave from CMKL, must arrange for the submission of official final transcripts to the University Registrar's Office. Upon receipt, Enrollment Services will verify these official transcripts then send a copy of the transcript to the AiCE program committee, who will make the transfer credit decisions. The official transcript will reside in the student's university academic folder in Enrollment Services.

## AI Engineering Institute University Network

Students participating in the study through AI Engineering Institute's (AIEI) university network can request for credit transfer directly using the AIEI system in lieu of submitting the transcript. Students can also request for a dual, or multiple-degree program evaluation to be considered for additional degree recipients from other host universities through AIEI. Note that the students must complete the AiCE program requirement and register at CMKL University for at least 2 semesters in order to receive a CMKL degree.

# 12. Post-Matriculation Guidelines

## 12.1 Return of University Property

AiCE students must return all borrowed university materials—such as software, manuals, library books/materials, or any other CMKL University property—prior to their departure from the program.

## 12.2 Career Services Employment Outcomes

AiCE students are asked to complete and return a survey for Career Services updating CMKL on their employment outcomes after graduation. Information about the survey is communicated in the students' final semester.

## 12.3 "Grandfather" Clause

When policies are changed, it is because the program believes the new rules offer an improvement; any such changes will be communicated to students. In case degree requirements are changed and certain modules are no longer offered, the program will try to find a reasonable compromise that allows those students to satisfy the original requirements.

# 13. Tuition and Fees

Unless scholarship and financial-aid packages are arranged and approved in advance, AiCE students are full-time and will be charged full-time AiCE tuition. Total charges for a period of attendance and estimated schedule of total charges for entire educational program can be found on the financial service website: `www.cmkl.ac.th/students/tuitions-and-fees`.

All charges incurred at the university are reflected in the student account. Charges include tuition and fees and may include health Insurance, technology fee, transportation fee, student activities fee and other miscellaneous charges incurred. Miscellaneous charges may include, but are not limited to, library fines, parking fines, or emergency loans.

The university also offers need-based assistance for financial aid as well as merit-based scholarships. Interested students are advised to designate their requirement in the application form.

## 13.1 Tuition Billing and Payments

The tuition rate for students entering the AiCE program is set in the spring for the class entering in the following fall semester. Tuition for a student's second fall semester will likely increase in accordance with the tuition increase of approximately 3% per academic year.

Students will be charged tuition per semester for each semester in which they are enrolled. The tuition and required fee billing are handled centrally by CMKL University finance department.

Student account invoices are produced on the last day of each month. Invoices detail and all transactions processed in the month, as well as any charges due in the future. Students will receive an

email notification to their CMKL email account when an invoice is ready for viewing. Payments for amounts due from a monthly invoice must be received by the 15th of the next calendar month. Any amounts not paid by the stated due date are subject to a 10% interest charge per year, or 0.83% per month, until the balance is paid in full.

# 14. Conclusion

CMKL University is ready to welcome promising and proactive leaders who want to prepare themselves for the challenges of tomorrow. We hope that this handbook has answered your questions about our philosophy, policies, and curriculum for the Master of Science in Artificial Intelligence and Computer Engineering. Should you have any questions or concerns, please do not hesitate to contact us.

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info@cmkl.ac.th

# APPENDIX A: List of Program Core Courses

The following courses are offered at CMKL University (additional courses may be added later).

**Computer Vision (CMKL 41-685) – 12 Units**

This course offers an in-depth introduction to computer vision, covering key areas such as image processing, detection and recognition, geometry-based and physics-based vision, and video analysis. Students will gain foundational knowledge in computer vision and practical experience in addressing real-world vision challenges.

**Software Engineering for AI-Enabled Systems (SE4AI) (CMKL 41-645) – 12 Units**

This course addresses the software engineering challenges of integrating AI and machine learning components into scalable and maintainable systems, such as mobile apps, web applications, and IoT devices. It is designed for software engineers seeking to understand the unique aspects of working with AI, and for data scientists aiming to transition prototype models into production environments. Rather than concentrating on model development, the course emphasizes the collaborative relationship between software engineers and data scientists. It covers essential topics like design, implementation, operation, and assurance, focusing on how these aspects interact with the data scientist's work. By facilitating effective communication and collaboration between the two roles, the course aims to streamline the deployment of AI-driven solutions from initial concept to operational systems.

**Computer Graphics (CMKL 41-662) – 12 Units**

Introduction to the principles of computer graphics in three dimensions. Topics include 3D geometry and affine transform, ray tracing, perspective and 3D viewing, the graphics pipeline, curves and surfaces, and human visual perception. This course emphasizes fundamental techniques in graphics, with practical assignments.

**AI Infrastructure & Accelerated Computing (CMKL 41-699) – 12 Units**

This course introduces accelerated computing with GPUs, emphasizing CUDA programming. Initially, we will cover CUDA syntax extensions and the CUDA runtime API. As we progress, the focus will shift to advanced topics including bandwidth optimization, memory access performance, and floating-point considerations. We will explore common parallel computing patterns like scans and reductions and examine practical applications of GPU acceleration such as matrix multiplication and convolution. Although the primary focus is on CUDA, the principles taught will also be applicable to other GPU frameworks.

**Natural Language Processing (CMKL 41-611) – 12 Units**

This course explores diverse methods for representing human languages computationally, focusing on applications such as translation, summarization, information extraction, question answering, database interfaces, and conversational agents. Known as Natural Language Processing (NLP) or Computational Linguistics, this field integrates principles from Machine Learning and Linguistics. The curriculum delves into computational models of words, sounds, sentences, meanings, and dialogues, emphasizing the role of probabilities and real-world text data in advanced techniques like translation and information extraction. Students will learn rapid prototyping, a valuable skill in software engineering and beyond, essential for developing innovative solutions in Computer Science.

**Foundation of Computer Systems (CMKL 41-613) – 12 Units**

This course emphasizes a programmer's view of how computer systems run programs, collect information, and communicate. This encourages and helps students to become more effective and efficient programmers, particularly in handling issues of performance, portability, and

robustness by teaching them the basic concepts underlying all computer systems (e.g., compilers, networks, operating systems, and computer architecture). We also provide a deeper understanding of the upper-level systems classes with the appropriate practice for the students. The topics will be covered in machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, processor architecture, memory organization, and management, networking technology and protocols, and supporting concurrent computation. This course prepares students to have the intellectual tools to solve the problem and develop other graduate-level computer systems courses to work in the real world.

**Generative AI (CMKL 41-623) – 12 Units**

This course delves into advanced techniques in machine learning and artificial intelligence that drive progress in generative modelling and foundational models. Students will learn to build and utilize state-of-the-art algorithms enabling machines to create realistic and innovative content. Key topics include the core principles of learning, constructing generative models like transformers for vision and language, and training such models effectively (including pre-training and fine-tuning). Scaling up to handle extensive datasets using multi-GPU and distributed optimization methods will also be covered. Additionally, students will explore practical applications such as generating code and integrating generative models into workflows. The course emphasizes both theoretical foundations and practical implementation, addressing challenges like bias, hallucination, adversarial attacks, and data quality issues, with strategies to mitigate these risks.

Prerequisites include prior knowledge of introductory machine learning or deep learning concepts.

**Introduction to Information Security (CMKL 41-631) – 12 Units**

Our growing reliance on information systems for daily activities, ranging from remote communications to financial exchanges, has made information security a central issue of our critical infrastructure. The course introduces the technical and policy foundations of information security. The main objective of the course is to enable students to reason about information systems from a security engineering perspective, taking into account technical, economic and policy factors. Topics covered in the course include elementary cryptography; access control; common software vulnerabilities; common network vulnerabilities; policy and export control laws, in the U.S., Japan, and elsewhere; privacy; management and assurance; economics of security; and special topics in information security. Prerequisites: The course assumes a basic working knowledge of computers, networks, C and UNIX programming, as well as an elementary mathematics background, but does not assume any prior exposure to topics in computer or communications security. Students lacking technical background (e.g., students without any prior exposure to programming) are expected to catch up through self-study.

**Artificial Intelligence, Business and Future Markets (CMKL 41-651) – 12 Units**

This course explores how artificial intelligence (AI) influences and transforms both new and existing markets. Students will collaborate in teams to identify, analyze, and synthesize emerging trends, performing in-depth studies on how these trends impact market creation and evolution. Teams will evaluate various AI technologies and their potential applications to develop solutions that address specific market opportunities. By understanding the role of AI in market dynamics, students will gain insights into how technological advancements can disrupt and shape industry landscapes.

**Foundations of Software Engineering (CMKL 41-652) – 12 Units**

In this course, students will get to understand computer software engineering paradigms that shaped the software industry over the past few decades. The course will emphasize the fundamental disciplines of computer software engineering together with engineering hands-on practices that crosscut systems, projects, and perspectives of the user. Moreover, the student will

get an understanding to iteratively define requirements, and architect, design, implement, integrate, test, and apply knowledge with a solution. The student will get a chance to work on self-organizing teams and handle the work collaboratively. Besides, students will also learn to solve a problem in the real world which is subject to multiple limitations while having the stakeholders involved throughout the lifecycle and balancing the underlying engineering trade-offs. The topic knowledge is essential to apply in a semester-long group project. Prerequisites: Basic software development experience with proficiency in at least one modern programming language and modern programming concepts. Before registering, students must complete a programming assignment to demonstrate familiarity with required software technologies.

**Software Requirements and Interaction Design (CMKL 41-658) – 12 Units**

This course refers to computer software design challenges through integrating two disciplines: requirements engineering and interaction design. Students will get an understanding of how to combine user research, design-based ideation and validation, and requirements definition, within an agile software development process. Students are essential to apply the knowledge on a semester-long project. We aim for the students to have the ability to design and implement the first version of an innovative software system that could achieve a unique contribution to our society. The system should address a problem in the real world, fulfill real stakeholders' satisfaction, and provide a superior user experience and agility. Students will get a chance to collaborate closely with stakeholders during the project for needs elicitation, design concept validation, and usability testing.

**Introduction to Machine Learning for Engineers (CMKL 41-661) – 12 Units**

This course provides an introduction to machine learning with a special focus on engineering applications. The course starts with a mathematical background required for machine learning and covers approaches for supervised learning (linear models, kernel methods, decision trees, neural networks) and unsupervised learning (clustering, dimensionality reduction), as well as theoretical foundations of machine learning (learning theory, optimization). Evaluation will consist of mathematical problem sets and programming projects targeting real-world engineering applications.

**Hardware/Software Co-Design (CMKL 41-701) – 12 Units**

This course explores how software and hardware come together to implement computer systems. The course will be extremely hands-on, with weekly development cycles. Students will learn a new concept within the language/processor stack (e.g., parsing) and will be expected to implement it by the following week. At the end of the course, each student will have a working version of a compiler, interpreter, and processor, that can all work in tandem with each other.

**Intellectual Property Law and Startup Regulations (CMKL 41-710) – 12 Units**

Become fluent in the rules of the new economy. The objective of this course is to provide students with a practical understanding of the underlying legal principles of intellectual property laws regulating the creation and exhibition of entertainment content. The class covers the basic legal concepts of intellectual property law, including case studies, but is aimed at non-lawyers and non-law students. In this class, you will learn how to identify the types of intellectual property protection available, analyze and interpret a patent document for a competing product, evaluate your options for protecting your creative innovations with copyright law, and develop strategies for protecting and maximizing your brand with a comprehensive trademark strategy.

**Introduction to Computer Security (CMKL 41-730) – 12 Units**

This course emphasizes on a principled introduction of defending against hostile adversary techniques in modern computer systems and computer networks. The topics are covered operating system security; network security, including cryptography and cryptographic protocols, firewalls, and network denial-of-service attacks and defenses; user authentication technologies; security for network servers; web security; and security for mobile code technologies

(e.g., Java and JavaScript). Moreover, some advanced topics will additionally be covered in this course, for example: intrusion detection; techniques to provide privacy in Internet applications; and protecting digital content (music, video, software) from unintended use.

**Computer Architecture and Systems (CMKL 41-742) – 12 Units**

This course begins with a review of traditional, sequential computer architecture concepts. Moreover, it will discuss the end of the convention as a result of the end of the steady trend and Moore's Law, as well as several trends that these changes precipitated. The first trend is a wholesale shift to parallel computer architectures and systems, which include parallel hardware and software execution models, cache coherence, memory consistency, synchronization, transactional memory, and architecture support for programming, debugging, and failure avoidance. The second trend is the emergence of newly capable hardware and software.

**Bayesian Statistics (CMKL 41-747) – 12 Units**

One way or another, subjectivity has always been present in scientific activity, starting from the assumptions to analyze a phenomenon. However, it is the informal approaches in which subjectivity is incorporated that yields to basic errors, misrepresentations or overrepresentations that occur in science. Bayesian Statistics takes advantage of expert and subjective knowledge, or previously learned knowledge of a phenomenon, incorporating it in mathematical models through an objective rule. The combination of expert information, current data, and the sequential learning framework make Bayesian models powerful tools to model complex systems which can learn from previous knowledge. The course starts with a mathematical background of fundamental concepts in Bayesian statistics such as prior, posterior, and predictive distributions. We will introduce such concepts and understand their interrelations through simple models. Then, we will explore theoretical aspects such as conjugate models or non-informative priors. Finally, we will explore more complex models, analyzing the different distributions of the model as powerful tools for prior elicitation, or model evaluation. Due to the mathematical challenges for analyzing in whole formality such models, they have been successfully implemented computationally. Doing the current success of Bayesian analysis is also a success of the computational engineer.

**Packet Switching and Computer Networks (CMKL 41-756) – 12 Units**

This course is intended to provide an understanding of the fundamental concepts in current and future computer networks. Previously, the bandwidth of transmission facilities was a scarce and expensive resource in communication networks. As a result, the networking and switching techniques used have been chosen to maximize the efficient use of this resource. These methods differed depending on the type of data carried: circuit switching for voice and packet switching for data. Circuit and packet switching elements are expected to be used in integrated networks. This course focuses on packet switching and protocol design for computer networks. The course covers computer networks in general, OSI layers, queuing theory, data link protocol, flow control, as well as congestion.

**Network Management and Control (CMKL 41-757) – 12 Units**

This course teaches the fundamentals of broadband networks. Broadband networks differ from existing communication networks in many ways, and these issues will be addressed in the course. Broadband networks are designed to support a wide range of services, from low bandwidth (telemetry) to high bandwidth applications (digitized video). The course will cover the fundamental concepts of broadband networks as well as research problems in next-generation networks. Many concepts (SDN, MPLS, high-speed switching architecture, high-speed network control, unified control plane, and optical networks) will be discussed. The course project will investigate cutting-edge network technologies, design networking systems, and evaluate them using simulation techniques.

**Introductions to AI Engineering (CMKL 41-763) – 12 Units**

This course goes beyond the theoretical foundation of AI algorithms, focusing on the practical implementation of Machine Learning and AI at scale, which necessitates a robust technical infrastructure. Students will gain hands-on experience with modern ML frameworks and infrastructure tools using large real-world datasets, making crucial engineering design choices. The curriculum covers Data Collection and Storage, Data Streaming, Data Engineering, Modern ML Frameworks, Model Validation and Monitoring, Neural Network Design and Implementation, Embedded Machine Learning, and Cloud Deployment of ML Models. Coursework includes substantial programming projects, where students design, implement, and analyze AI-model infrastructure, using an IoT-relevant dataset. The course combines lectures and hands-on labs, with readings from recent research papers and conference proceedings. Students will work on developing applications aiming to build a strong foundation in AI Infrastructure for future research and careers in data science and AI.

**Multimodal Machine Learning (MMML) (CMKL 41-777) – 12 Units**

Multimodal machine learning (MMML) is a dynamic field combining multiple communication modalities like language, sound, and visuals to address AI's foundational goals. Originating with audio-visual speech recognition and evolving into projects like image and video captioning, MMML tackles the challenges of heterogeneous data and modality interdependence. This course covers key mathematical concepts for MMML, such as multimodal alignment, fusion, heterogeneous representation learning, and multi-stream temporal modeling. It also reviews recent advancements in probabilistic models and computational algorithms, addressing six core challenges: representation, alignment, reasoning, generation, transference, and quantification. Topics include multimodal transformers, neuro-symbolic models, tensor fusion, mutual information, and graph networks. Applications like multimodal affect recognition, language grounding, and language-vision navigation will also be discussed.

**Planning and Decision-making (CMKL 41-782) – 12 Units**

Planning and decision-making are essential for autonomous robotic systems, enabling them to navigate, strategize, and interact effectively with their environment. This course explores the algorithmic techniques fundamental to these processes, including path and motion planning, coverage, and task planning. Through case studies involving multi-agents and autonomous systems, students will learn and implement these algorithms in various programming projects. A solid understanding of programming and data structures is required for this course.

**Ethics in AI Engineering (CMKL 41-784) – 12 Units**

Recent advancements in artificial intelligence, particularly in deep learning and reinforcement learning, have demonstrated capabilities comparable to human performance. However, the shift towards real-world applications, particularly in cyber-physical systems, raises significant concerns about safety. This course aims to provide a comprehensive understanding of trustworthy AI autonomy. It will cover essential topics such as adversarial attacks, generative models, hierarchical Bayesian models, safe reinforcement learning, rare-event learning, and robust evaluation methods. Through readings and research exploration, students will delve into cutting-edge research in trustworthy AI, focusing on its implementation and extensions. The course fosters teamwork and aims to equip students with the skills to conduct advanced research applicable to domains like autonomous driving, healthcare technology, robotics, and smart manufacturing. Suitable for students with backgrounds in statistical machine learning, robotics, control, or human-machine interaction, others are encouraged to consult with the instructor for suitability.

**Introduction to Deep Learning (CMKL 41-786) – 12 Units**

Neural networks, now widely known as "deep learning," have become pivotal in AI and machine learning, setting benchmarks across diverse domains from computer vision and autonomous vehicle planning to gaming strategies. Understanding neural networks and their deep learning frameworks is essential for researchers and developers in AI and NLP fields today. This course offers a comprehensive introduction, tracing the evolution of neural network theory and design. It swiftly progresses to explore various formalisms including feedforward, convolutional, recurrent, and probabilistic models, examining their development rationale and the challenges in training such networks along with proposed solutions. Additionally, the course covers extensions and specialized models tailored for applications such as computer vision, speech recognition, machine translation, and game playing. This broad overview equips learners with fundamental knowledge and practical insights into leveraging neural networks for cutting-edge AI tasks.

**Image and Video Processing (CMKL 41-793) – 12 Units**

This course focuses on signal processing techniques for 2D (images) and 3D (videos) signals. It extends 1D signal processing techniques and specializes in image and video processing. In this class, you will learn core tools and techniques for image and video processing, as well as how to apply them to a variety of practical applications. This course teaches the principles of image and video analysis. We will create picture and video-specific signal models, as well as associated optimization strategies for solving restoration challenges such as denoising and inpainting, as well as research specialized compression algorithms. The emphasis will be on transform-domain, PDE, and sparsity-based models, as well as the accompanying optimization approaches. Applications in mobile devices, medical image processing, and compressive sensing will enhance these formal techniques.

**AI in Geographic Computing Applications (CMKL 41-796) – 12 Units**

Geographic computing encompasses a wide range of important applications that relate to positioning, navigation and earth observation: location-based services, emergency response and disaster remediation, logistics, natural resources and environmental management, agricultural monitoring, industrial and commercial facilities siting, urban planning, etc. For decades, computer-based remote sensing image analysis and geographic information systems technologies have been applied to these problems. Now AI has greatly increased the power and scope of geographic computing. This course will introduce basic geographic concepts as well as data models and common algorithms for “classical” geographic computing, then examine a number of scenarios where AI techniques can significantly improve outcomes or make it possible to address previously intractable problems. Students in this course will complete a number of lab exercises involving classical geographic computing, then develop a small project that uses AI for a geographic application.

**Historical Perspectives on AI (CMKL 41-801) – 12 Units**

Stories in contemporary media suggest that Artificial Intelligence is a new and revolutionary set of technologies poised to change the world. In fact, AI has a history that reaches back to the nineteen seventies or earlier. Many of today’s AI accomplishments are built on foundations established in previous periods. On the other hand, the AI techniques that have demonstrated such recent success in some cases contrast sharply with approaches in earlier research. This course will provide an overview of AI history with the goal of giving students a better understanding of its deep roots and its cycles of hype. Students will read and analyze primary sources describing earlier AI advances as well as investigating the economic and political background of AI popularization. The primary evaluation for this course will be an individual term paper that explores some aspects of AI history with linkage to the situation today.

**Time Series and Forecasting (CMKL 41-835) – 12 Units**

Time series data appears across diverse fields, from meteorology and finance to econometrics and marketing. Through recording and analyzing this data, time series analysis enables us to examine industrial processes and monitor key business metrics, such as sales or engagement. This course is dedicated entirely to time series forecasting. You'll begin with simple forecasting methods that serve as foundational benchmarks for more complex models. From there, we will dive deeper into forecasting techniques, gradually increasing the complexity of models from statistical approaches to deep learning methods.

**Applied AI for Innovation (CMKL 41-501) – 6 Units**

Gain a comprehensive introduction to artificial intelligence by tracing its evolution from symbolic reasoning systems to contemporary machine learning and neural networks, while studying foundational algorithms, knowledge representation, and search strategies. The module emphasizes not only the theoretical underpinnings of AI but also the practical application of AI frameworks and tools to real business challenges. Students will critically evaluate AI solutions through case studies, examining the impact of AI adoption across various industries. Ethical, legal, and societal implications - such as bias, fairness, and responsible innovation - are explored, alongside strategies for effectively communicating AI concepts to non-technical stakeholders. Assignments focus on assessing the suitability of AI methods for organizational goals and proposing actionable solutions aligned with business needs.

**AI & Digital Transformation (CMKL 41-502) – 6 Units**

Investigate how artificial intelligence is reshaping digital transformation by blending technical foundations with strategic leadership. The module covers the integration of AI technologies—such as machine learning, natural language processing, and automation—into business models and processes, focusing on both the technical implementation and the development of actionable AI roadmaps aligned with organizational strategy. Attention is given to challenges like legacy system integration, data readiness, and workforce adaptation. Through case studies and group projects, assess organizational readiness, identify high-impact opportunities, and design transformation initiatives that balance innovation with risk and ethical considerations. The course culminates in the ability to lead and communicate both technical and strategic value in scaling AI-driven transformation within an organization.

**AI Ethics & Data Governance (CMKL 41-562) – 6 Units**

Integrate ethical frameworks and strategic data governance to establish a holistic model for AI systems and the data that powers them. Students will explore fairness audits, bias mitigation techniques, transparency and explainability standards, and accountability systems, with a focus on compliance with regulations such as PDPA and GDPR. The curriculum emphasizes stakeholder engagement, policy development, and the creation of unified organizational policies for responsible AI use. Topics also include data quality, security, lifecycle management, and real-world case analysis to develop governance models tailored to diverse enterprise contexts.

**Agentic AI (CMKL 41-601) – 6 Units**

Explore the core concepts and strategic applications of autonomous AI agents, focusing on identifying high-value use cases ranging from supply chain automation and robotics to personalized customer service and complex negotiations. The curriculum digs into agent architectures, reinforcement learning, and multi-agent coordination, while also examining the business models, operational efficiencies, and ethical challenges associated with deploying autonomous systems. Through group projects and real-world scenarios, students will evaluate integration strategies and develop leadership skills for guiding agentic AI adoption, emphasizing risk management, stakeholder communication, and solution design that aligns with organizational objectives.

**Data Modeling & Management (CMKL 41-634) – 6 Units**

Gain in-depth coverage of the data lifecycle, from acquisition and preprocessing to storage, management, and retirement, with a strong emphasis on data quality and governance. The curriculum includes advanced feature engineering, data versioning, and the implementation of robust data governance frameworks, as well as distributed data processing systems and best practices for data security. Students will explore model interpretability techniques such as SHAP and LIME, and examine the relationship between data quality and model performance. Assignments focus on building data governance frameworks and communicating data-driven insights to stakeholders in support of organizational objectives.

## Research and Innovation Requirements

**Research, Entrepreneurship and Innovation (CMKL 41-900) – 12 Units**

This unique course for the AiCE program introduces students to explore the connections between research, entrepreneurship and innovation. Students will be introduced to industries and tech communities. Students will participate in exploratory projects which introduce research methodologies while also learning how to apply engineering techniques to solve challenging real-world problems.

**Research and Development (CMKL 41-910) – 12–36 Units**

Students in AiCE programs will have the opportunity to participate in real-world supervised research and development projects. Students are encouraged to participate in existing projects with the university partners to gain professional experience in R&D.

**Internship for Graduate Students (CMKL 41-995) – Variable Units**

Experiential learning experiences are key educational possibilities for graduate students in the Artificial Intelligence and Computer Engineering department. An internship, which is usually conducted during the summer, is one such alternative. The AiCE Graduate Office will add the course to the student's calendar. Any AI and Computer Engineering graduate student who wishes to have their internship experience recorded on their official University transcript should follow this procedure. International students must also be authorized by program representatives. The completion of written assignments and requirements will determine the letter grade for the course.

**Graduate Teaching Internship (CMKL 41-999) – 12 Units**

The Teaching Internship for AI and Computer Engineering MS Students represents the capstone or culminating experience at CMKL University in the preparation of prospective lecturers as knowledgeable, reflective practitioners and emerging leaders who conduct themselves ethically and professionally. The semester-long internship provides MS Students many opportunities within diverse classroom settings to refine the knowledge, skills, and dispositions they have developed as active participants in the Electrical and Computer Engineering Program. A teaching assignment with major responsibility in the classroom for MS Students in AiCE course.

## Entrepreneurship and Capstone Project Requirements

**Business Intelligence (CMKL 41-901) – 12 Units**

This course provides a robust foundation in business intelligence, emphasizing the development of skills to interpret data and apply data-driven approaches to address real-world business challenges. Students will learn to harness analytical tools and techniques to generate actionable insights that support strategic decision-making and optimize business performance, particularly in the context of creating and launching new ventures.

**Capstone Project (CMKL 41-920) – 12–36 Units**

The Capstone Project is an intensive, team-based experience in which students collaborate to design, build, and launch an innovation driven business venture. Working in small teams, students apply the knowledge and skills acquired throughout the program to address a real-world opportunity or problem. Students will have the opportunity to gain hands-on experience in venture creation, supported by guidance from expert faculty, industry advisors and strategic partners.

## AI Innovation Courses and Innovation Project Requirements

**Strategic Decision Frameworks (CMKL 42-532) – 6 Units**

Combine game theory, behavioral economics, and decision science to provide a comprehensive framework for strategic planning and decision-making in AI contexts. Students will model competitive and cooperative scenarios, predict agent and human behaviors, and optimize outcomes in uncertain and dynamic environments. The module covers Nash equilibria, decision trees, utility theory, and applications in AI-driven negotiations and resource allocation. Through practical exercises and simulations, students apply theoretical concepts to real-world strategic challenges, emphasizing stakeholder communication and the development of solution strategies for complex business environments.

**Innovation & Creative Problem-Solving (CMKL 42-652) – 6 Units**

Develop creative thinking and systematic problem-solving skills using methodologies such as design thinking and TRIZ. Students will engage in ideation exercises, rapid prototyping, and creative facilitation in team environments, with an emphasis on generating innovative solutions to complex, ambiguous problems and translating ideas into actionable projects. The module builds a toolkit for fostering innovation within organizations and driving AI-powered change.

**IP & Regulatory Frameworks (CMKL 42-654) – 6 Units**

Examine the landscape of intellectual property (IP), regulatory compliance, and industry standards relevant to AI innovation. Students will learn about patent strategies, open-source licensing, and the impact of global regulatory regimes on AI development and commercialization. The course covers standards development, risk management, and legal considerations in deploying AI solutions across jurisdictions, with practical exercises in drafting IP protection strategies and compliance plans.

**AI Innovation Project (CMKL 42-900) – 6 - 12 Units**

Work in teams to identify a real-world business or societal challenge and develop an AI-powered solution, service, or product to address it. The project encompasses all stages of innovation, including problem identification, market and technical feasibility analysis, solution design, prototyping, and business modeling. Students will prepare a comprehensive pitch, including technical architecture, go-to-market strategy, and financial projections, and present it to a panel of faculty and industry experts. The project emphasizes interdisciplinary integration, entrepreneurial thinking, stakeholder engagement, and the practical application of skills acquired throughout the program, ensuring graduates are prepared to deliver both technical and business/managerial execution in real-world contexts.

## Technology and Creative Innovation Courses

**Game Engine Fundamentals (CMKL 56-541) – 6 Units**

This hands-on introductory course to game development uses the professional Unreal Engine to teach game engine fundamentals. Students will learn the engine's interface, basic scripting, level design tools, and fundamental workflows, covering game engine interface and navigation, visual scripting, level design basics (terrain, lighting), importing assets, basic material creation, and creating simple game interactions.

**Advanced Game Mechanics and Techniques (CMKL 56-542) – 6 Units**

Building upon Game Engine Fundamentals, this course explores more advanced game engine features and techniques within Unreal Engine, specifically focusing on advanced game mechanics and development techniques, including advanced scripting, material functions and shaders, advanced lighting techniques, performance optimization, AI and navigation, and creating complex game mechanics.

**Crowd AI: Simulating Group Behavior in Games (CMKL 56-543) – 6 Units**

This exploration course focuses on implementing AI-controlled group behaviors within game environments, teaching crowd AI for simulating group behavior in games. Students will learn techniques for creating realistic crowds, flocking simulations, and NPC interactions within group contexts, covering flocking algorithms (Boids etc.), crowd simulation techniques, navigation meshes and pathfinding, group behavior AI, state machines for groups, and optimizing AI for performance.

**Character AI: Designing Believable Game Agents (CMKL 56-544) – 6 Units**

This course centers on designing and implementing AI for individual game characters, focusing on character AI for believable game agents. Students will explore techniques for creating believable NPC behaviors and incorporating AI influences, potentially touching upon virtual character technology, examining finite state machines, behavior trees, decision-making algorithms, AI perception (sight, hearing), pathfinding for individual agents, and integrating AI with animation.

**Virtual Reality (VR) (CMKL 56-545) – 6 Units**

This course introduces Virtual Reality (VR) technology and its role in immersive media. Students will gain a foundational understanding of VR principles, hardware/software, and interaction design. Specifically, students will learn about VR hardware (headsets, controllers), VR software development kits (SDKs), interaction design specific to fully immersive environments, spatial audio within VR, and user experience considerations in VR. Students will explore the unique aspects of creating and interacting within completely simulated digital spaces.

**Augmented Reality (AR) and Mixed Reality (MR) (CMKL 56-546) – 6 Units**

This course introduces Augmented Reality (AR) and Mixed Reality (MR) technologies and their application in blending digital and physical worlds. Students will gain a foundational understanding of AR/MR principles, hardware/software, and interaction design. Students will learn the differences between AR and MR, AR/MR hardware (smart glasses, mobile devices), AR/MR software development kits (SDKs), interaction design for overlaying digital elements onto the real world, spatial understanding, and user experience considerations in AR/MR. This will include learning how to create digital content that interacts with and responds to the user's physical environment.


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