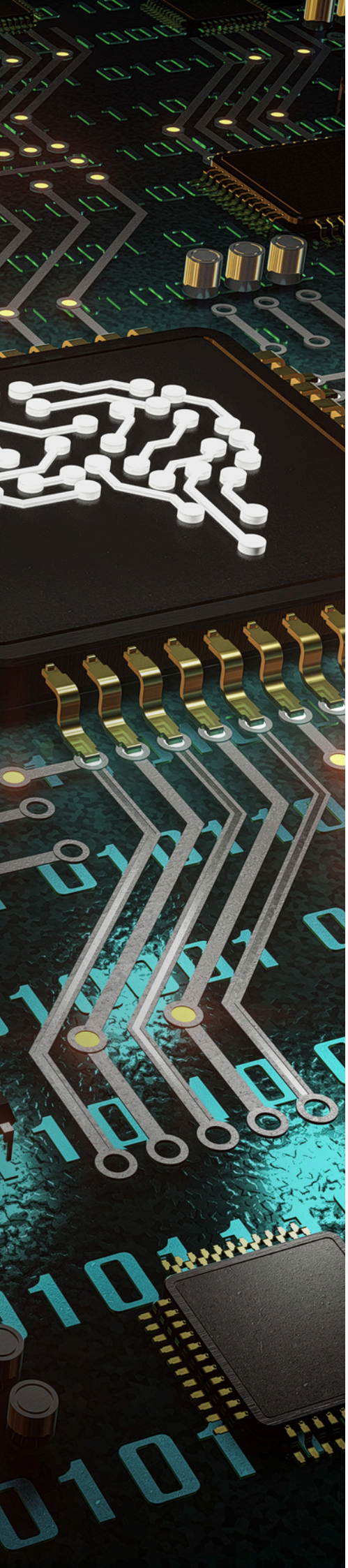

Bachelor of Engineering in

Artificial Intelligence and Computer Engineering

(B.Eng. in AiCE)

STUDENT HANDBOOK

Bachelor of Engineering in

Artificial Intelligence and Computer Engineering

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Student Handbook

Last Update: October 29, 2025

Contents

WELCOME TO ARTIFICIAL INTELLIGENCE AND COMPUTER ENGINEERING

Welcome to the Artificial Intelligence and Computer Engineering Program (AiCE) at CMKL University. CMKL University was established in 2017 as a collaboration between Carnegie Mellon University (CMU) and King Mongkut's Institute of Technology Ladkrabang (KMITL) for a graduate dual-degree program in Electrical and Computer Engineering. Building on the experience of this collaboration, CMKL University has established the Artificial Intelligence and Computer Engineering Program (AiCE) with B.S., M.S. and Ph.D. degrees.

The undergraduate AiCE program at CMKL builds upon the lessons learned from our graduate program experience while having the mission to pursue new frontiers in AI, Computer Engineering, and Innovation. Our competency-based learning program provides a well-rounded foundation of knowledge that can be put to immediate use to help people and organizations solve their real-world problems. Moreover, through artificial intelligence, computer engineering and an entrepreneurial perspective, AiCE graduates can assist our society in tackling challenges that will propel the future development of Thailand and Southeast Asia.

Our undergraduate education and research programs provide students the opportunity to experience and participate in real-world engineering research and projects, collaborating with partners of CMKL and of Carnegie Mellon University in the US. Carnegie Mellon has led the world in AI education and innovation since the earliest work in AI, more than half a century ago. Its interdisciplinary research and rigorous education programs have become the touchstone for an international computing education. CMU provides a standard that our AiCE program aims to achieve.

CMKL also hosts the AI Engineering Institute (AIEI) which is a collaboration among leading Thai universities to advance AI Engineering education and research. In addition, our university serves as a hub of national AI super computing research infrastructure. Our students will be equipped with cutting-edge engineering research and education while accessing the best facilities and AI supercomputing. Students will be guided through the best practices used for building effective AI-systems, led by our faculty who are world-class academics and experts in the field.

In this handbook, you will find more information about the AiCE program. If you have questions or concerns not covered in this handbook, please do not hesitate to reach out to us. I am looking forward to seeing our graduates making positive impacts in the field, enabling future possibilities for our economy and society.

Sincerely,

Akkarit Sangpetch,
AiCE Program Director,
CMKL University

BRIEF OVERVIEW OF PROGRAM

Thailand's first integrated bachelor's degree in artificial intelligence and computer engineering! 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, as well as 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 team of researchers and faculty members from leading universities.

Vision

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

Mission

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

Value

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

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.

Student Learning Outcomes

To achieve the program educational objectives, each student must acquire specific skills, which we define as **student learning outcomes (SLO)**. Some of our SLOs are based on guidelines established by the Engineering Accreditation Commission (EAC) of ABET. Others are specific to the AiCE program, linked to the program's emphasis on entrepreneurship and ethics. Every educational activity within the AiCE curriculum is designed to foster one or more of these outcomes.

- Solving engineering problems: Our students must possess the fundamental mathematical, scientific and engineering knowledge required to analyze problems and propose solutions. In addition, they must be able to find and deploy appropriate technologies to build those solutions.

- Designing to meet requirements: Our students must be able to fit problem solutions to requirements and constraints provided by stakeholders. To achieve this, they must use design techniques and tools appropriate to the problem domain.

- Effective communication: Communication is a prerequisite to all problem solving activities. Our students learn to express their ideas and their designs clearly and logically, both in writing and orally. The AiCE program also helps students understand how to customize the organization and content of communicated content based on the audience and the goals of the communication.

- Ethical awareness: As technology becomes increasingly pervasive in our lives, engineering decisions have more and more impact on society and humanity. Our students learn to look beyond the technical aspects of their work to consider ethical principles such as acting fairly; preserving privacy; avoiding physical, economic or psychological harm; being honest and trustworthy; and generally contributing to societal well-being.

- Teamwork: Collaboration and cooperation are essential in order to tackle serious real world issues. Working with faculty mentors, AiCE students learn to function effectively in teams starting from their very first semester in the program. We focus on planning and time management, clear intra-team communication, conflict resolution and commitment to team goals.

- Experimental data analysis and design: Theory is important, but without supporting data can be misleading. Our students learn to practice the scientific method, generating hypotheses then testing them by observation and data analysis.

- Self-learning: Information and knowledge are growing exponentially. No academic program can teach everything a student will need to know, especially given the pace of technological change. The AiCE program expects students to search out relevant information and acquire necessary skills on their own, without the explicit guidance of instructors. In addition, we foster a disposition for self-learning: the willingness to spend the time on research and the discipline to study and learn.

- Empathy: In every class, we encourage our students practice empathy. Empathy is the willingness and ability to adopt the perspective of someone else in order to understand that person's objectives, attitudes, desires, and fears, as well as their possible cognitive or perceptual limitations. Empathy includes a human-centered focus, that is, an approach to design, development and problem solving that gives priority to users' or stakeholders' comfort, well-being and achievement of goals.

- Proactiveness: Our program rewards students for being proactive. Proactiveness is a forward-looking attitude that anticipates possible problems or tasks. Proactive individuals act in anticipation of future needs rather than waiting passively to respond to situations as they arise.

- Professionalism: The AiCE program prepares students to participate in society as engineering professionals. Professionalism means demonstrating behavior that is appropriate to a working environment, effective in achieving the goals of one's organization, and consistent with the expectations of one's organization.

- Entrepreneurial awareness: Students in the AiCE program learn practical, realistic skills related to designing, developing and sustaining business ventures to support the dissemination of engineering products. Our program works to familiarize students with business issues and processes from the first semester. As part of this effort, we work closely with experienced outside individuals from a wide range of industries.

INTRODUCTION

Degrees Offered

Undergraduates of the B.Eng. 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 B.Eng program based on the student's background and academic goals.

Undergraduate Student Handbook

This handbook is intended to set guidelines and expectations for new and current undergraduate 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.

CMKL UNIVERSITY STATEMENT OF EQUAL ACCESS

CMKL University adheres to nondiscrimination policies set forth in Thai national laws and executive orders. The University does not discriminate against a person on the basis of race, color, religion, national origin, gender, sexual orientation, religion, ancestry and belief in admission, employment, or administration of its programs or activities.

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

CMKL FACULTY

Throughout their time in the 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

(https://www.cmkl.ac.th/aice/faculties).

Instructors

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Associate Professor, CMKL University
B.S., Electrical and Electronics Engineering, University of Pennsylvania, USA
M.S., Electrical Engineering, University of Wisconsin, USA
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M.Sc., Probability and Statistics, Centro de Investigación en Matemáticas, Mexico
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M.S., Software Engineering, Chulalongkorn University, Thailand
Ph.D., Information Science, Japan Advanced Institute of Science and Technology (JAIST), Japan

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Ph.D., Computer Science, Trinity College Dublin, Ireland

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Ph.D., Computer engineering, Automation and Signal Processing, France

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Ph.D., Computer Science, Indiana University, Bloomington, USA

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MBA, International Business, Bryant University, USA

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Ph.D., Mechanical Engineering, Stanford University, USA

PRE-MATRICULATION

Admissions Policies

Admission criteria for the B.Eng in AiCE Program are designed to reflect our core values and competencies. The student's high school performance will be a significant factor in our admission decision. The program will consider the curriculum rigor, the student's performance and the work accomplished during their study. Student's non-academic interests, including extracurricular involvement, part-time jobs, family commitments, hobbies and community engagement are also important in the admission process. 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 website:
https://www.cmkl.ac.th/aice/bachelor/overview

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 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 or Duolingo English Test as evidence of English language proficiency. Please refer to the admissions website for minimum requirements for each test.

Final Transcripts

As a condition of enrollment at CMKL University, applicants admitted to the AiCE program must submit final official transcripts, properly sealed or digitally certified, upon completion of their graduation requirements conferring their high school diploma or equivalent. Certificates of graduation and/or high school diploma or equivalent should also be submitted if provided by the schools. 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 B.Eng in AiCE degree from being certified.

AiCE ACADEMIC PROGRAM

Overview

The B.Eng. AiCE program uses an innovative, flexible, self-paced curriculum based on competencies rather than courses. A competency is defined as a set of specific knowledge topics and skills that students must master in order to proceed toward their degree. Competency is an active learning concept; for most competencies, mastery will be assessed not by traditional examinations but by the completion of tasks or projects.

The amount of work required to master a competency will depend on both the specific competency and the student's pre-existing capabilities. Students can choose to proceed directly to the assessment process if they believe they already have the skills encompassed by the competency. On the other hand, students with no prior background in the areas covered by the competency can study the concepts and complete practice exercises to develop their skills before assessing their level of mastery.

Each competency provides a specified number of credit units, based on the faculty's estimate of the average amount of work required for mastery. Typically, the successful mastery of a competency will earn a student 3 or 4 credit units, though some competencies may have smaller or larger scope. Since traditional courses at CMKL normally provide either 9 or 12 units, this suggests that completing three or four competencies will be the equivalent of a traditional course.

At the end of any semester, a student can request an academic transcript which will include grades that indicates the student's mastery level for each competed competency. Note also that the AiCE curriculum provides mechanisms for students to re-do a competency if they are not satisfied with their level of mastery.

The current set of defined competencies in the AiCE curriculum is presented in the section below entitled B.Eng in AiCE DEGREE REQUIREMENTS.

Degree Progress and Planning

Student Responsibility

The AiCE program requires students to take responsibility for their own learning. This includes defining a learning roadmap for each semester, which specifies a set of competency milestones as well as target dates for achieving them. The program will offer some pre-defined roadmaps, but the student will normally adapt these milestones based on their background, interests and selfevaluation of learning styles. The AiCE program goal is to permit self-paced learning, avoiding the problem in traditional courses where material is presented too quickly for some students and too slowly for others.

Because each student will potentially be involved in different, individual learning activities, instructors will not be monitoring the students' daily schedules. For instance, even for required competencies, a student will not necessarily have to attend lectures if he or she feels this is not useful.

This means that students need to be proactive and responsible in selecting learning activities, doing reading, research and practice tasks, and deciding when they are ready to attempt formal assessment activities.

In short, students who are passive learners and who expect to be given detailed directions for every step in their degree process will not be successful in AiCE.

At the same time, every student will have an assigned academic advisor who will serve as a mentor and guide. Advisors can help students plan their learning paths as well as suggesting best practices for effective studying and time management.

Ultimately it is the sole responsibility of the student to manage the academic progression of their program. If a student is not progressing as expected or is concerned about completing degree requirements, he or she is expected to seek advice and counsel from the academic advisor.

Registering for Competencies

Students enrolled in B.Eng. AiCE use a custom-developed, competency-based software platform called A1CE to plan their learning paths for each semester. Adding a competency milestone to the semester road-map is similar to registering for a course in a more traditional program. The main differences are that the activities associated with a competency will usually have a duration shorter than the full semester, and that the students have control of when they will assess their mastery. The midterm and final examination schedule published in the CMKL University calendar is not relevant to the AiCE program.

Although the AiCE competency-oriented curriculum is flexible and self-paced, adding a competency to the road map should be viewed as a commitment to mastering that competency within the semester. Students have the option of adding competencies/milestones to their roadmap up until the add/drop deadline in the university calendar. If a student wishes to add a competency after the add/drop deadline, he or she must obtain the formal approval of both the instructor responsible for the competency.

Students have the option of removing competencies from their road map during the semester.When a competency is dropped, it will not appear in the student's transcript. However, the A1CE platform will retain information about any skills within the competency for which the student has already demonstrated mastery, so the student will not need to repeat any work if the competency is added in a later semester.

Degree Requirements Timeframe

AiCE adheres to the official CMKL University Calendar, which can be found at https://www.cmkl.ac.th/cube/student-experience/academic-calendar.

B.Eng in AiCE is a four-year program. A three-year accelerated study plan is also available to allow highly motivated students to earn a B.Eng in AiCE in three years. The three-year option is particularly appropriate for those who enter CMKL with pre-matriculant credits such as Advanced Placement, International Baccalaureate, or college credits earned during high school.

The AiCE undergraduate curriculum requires the completion of at least 360 credit units. This includes core program requirements and electives, math and science competencies, social science, and other non-technical competencies, and at least six semesters of undergraduate research and development. For details, consult the section entitled B.Eng in AiCE DEGREE REQUIREMENTS below.

Credit units are related to expected work hours for a competency. However, given the self-paced nature of the AiCE program, the required working time is just an estimate.

Furthermore, the official definition of credit unit is based on a full semester. Each credit is intended to represent one hour of work per week during the roughly fifteen weeks of a full semester. In contrast, most competencies have a smaller scope than a full course and are expected to be completed in a shorter time. In addition, some students may have prior experience or knowledge which will allow them to spend less time than implied by the credit unit allocation to master a particular competency.

For example, assume that a competency is associated with 4 credits. If the student sets a goal for completing the competency in five weeks, this implies a workload of (4*15)/5 or 12 hours of work per week.

Students are encouraged to be physically present at the start of the semester, so they can engage in learning activities and meet their peers and their advisor. If extenuating circumstances exist that prevent a student from attending learning activities or meeting with the advisor, a student should notify the academic advisor and instructors immediately.

International students will need a Non-immigrant (ED) ("educational") visa during the academic year, which can be extended. International students also need a valid re-entry permit if they wish to leave Thailand temporarily then return. Leaving the country without a re-entry permit will result in the cancellation of their educational visa. CMKL staff will assist international students in dealing with the Thai immigration department.

Full-time Requirements

Undergraduates who are registered as full-time students at the end of the second week of any semester are expected to remain full-time for the duration of the semester. Full-time is defined by the total number of credits for the competencies to which a student has committed in that semester.

Full-time students must commit to a minimum of 36 credit units for each semester. If their total committed competencies for a semester falls below 36 units, the student must obtain permission from the program director to remain in the program.

CMKL recommends that students take no more than 60 credit units in any one semester while pursuing a degree at CMKL. However, a higher credit load may be undertaken if the student has demonstrated significant capability or need.. Individuals who exceed the recommended limit but who fail to satisfactorily complete their registered competencies will not be allowed to take more than 60 credits in any subsequent semester.

Repeating Competencies

At the end of each semester, students are required to review their progress in completing their selected competencies, including the mastery level they have achieved. If a student does not achieve satisfactory mastery of a competency, they have the option of redoing some or all of the work and the assessments. This is discussed in the ACADEMIC STANDARDS section. If the student chooses to finalize the grade, that grade will be recorded to the transcript and factored into the cumulative QPA.

Transferring Credits from Another University

External applicants from other universities who are applying for transfer to AiCE must arrange for submission of:

- Official interim or final transcripts to the Office of Undergraduate Admission as part of the admission process.
- Official, final transcripts to the Office of Undergraduate Admission once they are admitted and prior to their beginning coursework at CMKL.

If the transfer student is accepted into the program, the academic faculty will review the official transcripts and decide what competencies should be credited for each individual transfer student.

Transferring Credit from High School Courses

CMKL University may award transfer credit for some courses taken in high school. This will avoid the need for students to repeat unnecessary learning activities or assessments, as well as potentially shorten the time required to earn a bachelor's degree. This policy is in addition to the specification below regarding formal Advanced Placement courses.

In order for incoming students to receive credit for courses completed in high school, the student's school must have previously registered with CMKL University and must have submitted the syllabi and instructor information for courses the school wants considered for transfer. CMKL University faculty will review the course material and decide which, if any, competencies can be aligned with the course material, then notify the school of their decision.

Registered schools must submit syllabi for the relevant courses every two years, or if the course has undergone significant changes in content.

If an entering student wants to be considered for credit, but his or her school has not previously registered with CMKL University, the student should discuss this with the advisor. One way for students to receive credit is for them to immediately undertake the assessment activities for relevant competencies upon entry to the AiCE program.

Standard Course Equivalents for Advanced Placement Units Policy

The university has standard units assigned to Advanced Placement (AP), International Baccalaureate (IB) credits and A-Level for AiCE program. Standard course equivalencies for each exam will be deter-

mined by the program committee in AiCE program for each acceptable AP/IB/A-Level score. Under this procedure, students' AP/IB/A-Level credit for a particular course will only go toward AiCE degree requirements which are allowed by program policies. This policy assumes no significant exam changes. In the event of significant exam changes, students will be notified of any resulting policy changes no later than July 30 prior to their enrollment to take effect the fall of that year. For details see Appendix A.

Advanced Placement Courses

CMKL recognizes the Advanced Placement program and may grant advanced placement and credit for test scores of 4 or 5. When they take the tests, prospective students should request that the results be sent to CMKL University. For details see Appendix A.

International Baccalaureate Program

CMKL also recognizes the International Baccalaureate Examination and may grant advanced standing and/or credit in various fields if scores on the higher level examination range from 6 to 7. Students should include these examination results in their applications to CMKL University. For details about currently recognized courses, see Appendix A.

Cambridge General Certificate of Education

CMKL recognizes the Cambridge GCE A-Level (advanced level) examinations in various higher level subjects and may grant advanced placement and/or credit for exemplary grades. For details about currently recognized courses, see Appendix A. Please note that we do not accept GCE "O" level examinations for placement.

TR Grade Replacement

Students have the option to master competencies for which they have received transfer credits prior to their entry. To be assigned a mastery level for a transferred competency, students must first obtain formal approval from the instructor responsible for that competency. The instructor must agree to the proposed plan for grade replacement. Once approved, students can add a competency milestone to their semester roadmap and complete the formal assessment activities to earn a mastery level for that competency. The student may elect to take the competency as a regular class or perform assessment-only activities for the competency. If a student chooses to finalize the grade, it will be recorded on the transcript and factored into the cumulative QPA, total credits, and academic standing.

ENROLLMENT AND DEGREE CERTIFICATION

Enrollment Verifications

The Cube (https://www.cmkl.ac.th/cube/overview) is the primary contact for students or alumni who would like to request a transcript, enrollment verification, or other information related to their time in AiCE.

AiCE may provide a letter to verify some limited information, which may be suitable for some purposes, such as the verification of skills students acquired through the AiCE program. Please contact your academic advisor for more information.

Leave of Absence

A students may request a temporary leave of absence for personal reasons. Students who need to take a leave of absence should discuss their plans with their academic advisors. They must also submit the appropriate signed form to the Cube.

A student on leave for two semesters or less may return to the AiCE program without reapplying to the program. If the returning student is on academic probation, a new interview will be required before they will be allowed to resume their studies. Students taking more than two semesters leave of absence will be required to reapply to the program.

International students should consult the Cube regarding the implications of a leave of absence on their student visa status.

Returning from a Leave of Absence

Students wishing to return to CMKL after a leave of absence must submit an Application for Return form at least one month before the start of the semester in which they want to resume their studies. The decision about whether a student will be accepted back into the program will depend on how long they have been on leave and their academic status. Space restrictions may exclude students who wish to return after two years or more of absence.

Students on leave are not permitted to attend classes, or continue to work as students at CMKL while their leave is in effect, according to university regulation on student leaves.

Degree Certification Process & Commencement

The B.Eng in AiCE degree will be certified after students successfully complete all competency and credit requirements with a cumulative Quality Point Average of at least 2.0. For undergraduate students who enrolled at CMKL as freshman and whose freshman grades cause the cumulative QPA to fall below 2.0, this requirement is modified to be a cumulative QPA of at least 2.0 for all competencies taken after the freshman year. Note, however, the cumulative QPA that appears on the student's final transcript will be calculated based on all grades, including freshman year. Students are encouraged to confirm all graduation requirements with their academic advisor.

In addition, students must have provided a final copy of their high school transcript(s) and must have not have any outstanding tuition balance to receive a diploma. Students will be notified of their degree certification via email once the certification has been completed.

Before graduation, students should update their contact information, such as mailing address and email address, within Cube system. Also, students should review a proxy of their diploma in Cube to verify the information displayed there, such as the spelling of their name.

A CMKL diploma is a student's certificate of accomplishment. The diploma is printed with the name the student approved within CMKL Cube Registration system, along with the student's primary degree.

Diplomas are distributed to graduates during or immediately following the Commencement Ceremony. Certain circumstances will result in students receiving their diplomas at a later date, and such students will be informed of this well before the ceremony. If a student is unable to attend the ceremony, diplomas will be available for pick-up or mail-out in the weeks following commencement. Diplomas are not available prior to the stated date of graduation. August and December graduates will receive their diploma via the mail.

The title of the degree students receive is
Bachelor of Engineering in Artificial Intelligence and Computer Engineering.

ACADEMIC STANDARDS

Grades

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

Competency Grading Policy

The AiCE curriculum is competency-based. This means that the fundamental unit of student work is a ***competency***: a group of related skills, usually linked to subject-matter topics, that a student is expected to acquire and demonstrate. To demonstrate their acquired skills, students must complete ***assessment activities*** which are then graded by the instructor. Typically there is one assessment activity per skill, but it is also possible for an instructor to combine a multiple skills into a single activity.

Each competency in the curriculum has an associated number of credits. To earn these credits, a student must complete and submit assessment activity outputs for *all the required skills* in a competency, and the instructor must provide grades for all of them. At this point, the competency has the status *Completed* and is assigned a mastery level, as described in Section 2.

One advantage of the competency-based curriculum is that students can re-do individual assessments, or an entire competency, if they are not satisfied with their performance. The rules for this are explained

in below in the section entitled **Re-doing Assessments and Competencies.**

Assigning a Mastery Level for a Competency

AiCE requires instructors to grade every assessment/skill on a consistent scale from 0 to 100. If an assessment activity addresses multiple skills, the instructor provides a 0-100 score for each skill. These might not be the same for each skill, depending on the student's capabilities with regard to each skill as demonstrated in the assessment activity.

When all the required skills for a competency have been assessed, the system computes and stores a *mastery level*. Mastery levels are defined as follows:

Letter Grade and Numeric Equivalent	Mastery Level	Score	A1CE Level	Interpretation
A 4.0	Expert	90-100	Legend	The learner has demonstrated a high level of conceptual and procedural understanding of the specific knowledge and skills.
B 3.0	Mastery	75-89	Master	The learner has demonstrated understanding of specific knowledge and skills.
C 2.0	Partial Mastery	60-74	Apprentice	The learner is emerging but does not yet demonstrate understanding of specific knowledge and skills.
D 1.0	Insufficient Evidence	Below 60	Novice	The learner has not provided enough evidence to assess proficiency.
0	0	Below 50	No level assigned	Students get no credit for this competency

Table 1: AiCE Grading

The overall competency score is simply the average (arithmetic mean) of the individual assessment scores, rounded to the closest integer. Note that a zero score for an assessment is interpreted as if the student had not done the assessment activity at all. Thus if a student receives zero for any assessments, they need to redo them in order to complete the competency.

The mean score is converted to a mastery level according to the table above.

Once all the skills in the competency have been completed and a mastery level has been assigned, the student can earn the credits associated with the competency. These credits count toward the total earned during the semester.

At the end of each semester, each student must review all completed competencies and decide whether to record those competencies in the registration system. Once the competency has been recorded, it is not possible to redo assessments for that competency (though the student can choose to repeat the entire competency in some future semester.) If the student is not satisfied with his or her grade for the competency, he or she can defer the recording process.

A few competencies may be offered on a Satisfactory/No Credit basis. For these competencies, a minimum level of participation is sufficient to receive credit. Student performance is not associated a specific mastery level. A satisfactory grade means the credit units associated with the competency will contribute to the total required for graduation, but the competency will not be considered in the calculation of GPA.

Re-doing Assessments and Competencies

If a student is not satisfied with his or her performance on some assessment, it is possible to redo that assessment. The rules for this are as follows:

1. The competency associated with the assessment *must not have been recorded* in the registration system.
2. The student must inform the instructor that he or she would like to redo the assessment.
3. The instructor must agree with the plan to redo the assessment. The instructor is free to specify additional requirements. For instance, if the student has not yet completed other assessment activities, the instructor can require that the other assessments be submitted first. The instructor may also ask the student for evidence of new practices or learning activities the student has undertaken, which would enable the student to get a higher score.

Students are required to observe a minimum waiting period of four weeks before attempting to redo an assessment for the first time. Subsequently, a waiting period of at least eight weeks is mandated before a second attempt. In the event of a third attempt, students must present the instructor with tangible evidence of sustained efforts to enhance their mastery level. This evidence may include completed practice assignments, a comprehensive list of readings, or any other relevant materials. The instructor reserves the right to decline providing another assessment problem if they find the submitted evidence unsatisfactory.

If the entire competency has already been completed and assigned a mastery level (but not recorded), the score assigned for the re-done assessment will be used to recalculate the mastery level. It is possible (but hopefully not likely) that the new mastery level could be lower than the original. Students **do not** have the option of choosing the better score out of the two assessment trials.

A student also can choose to redo an entire competency in a different semester. In this case, the new attempt is said to *supersede* the previous competency. The student does not necessarily have to repeat all the assessments for the competency. If he or she wants to transfer some completed assessments from the superseded competency to the new competency, the instructor must agree. If the rework is to be done in the immediately following semester, we call this *extending* the competency. However, it is possible to defer the rework to a future semester.

The AiCE program recognizes that students may have prior experience or have completed outside projects that helped them to develop the skills associated with a competency. A student in this situation may request that the instructor for that competency provide an alternative assessment based on this previous work. The nature of the alternative assessment is up to the instructor. It may consist of an interview or oral exam, an essay describing the project, the instructor's review of the project deliverables (such as source code) or a special activity intended to measure all the competency's skills.

A student who successfully completes such an alternative assessment can receive credit for the competency without attending lectures or doing regular assignments. In order for the student to receive this credit, the instructor must send an email to the Program Coordinator certifying that the student should receive credit and specifying the mastery level. The Program Coordinator will then record the assigned credit.

Incomplete Grade

As noted above, students will receive credit only when they have successfully demonstrated mastery of all the skills that define a competency. If they have do not complete all the necessary assessments, they may continue working on the missing assessments in the following semester. This is called *extending* a competency.

Students who add a competency in a semester but do not complete it will see an Incomplete (I) grade on their transcripts for that semester. This has no effect on GPA or credits, but retains a record of the fact that the student worked on the competency during the term. If students decide that they have been overly ambitious in their planning and cannot finish a competency, they can delete it from their study road map before the final assessment date. This will avoid the appearance of the I grade.

Withdrawal Grade

Since students have complete control over their study road map, the issue of a Withdrawal Grade does not arise. Students can remove a competency from their road map at any time. If students do not remove the competency, but do not complete all its assessments within the semester, their situation will be as described in the previous section regarding incomplete grades.

Academic Performance

Credit Units and Quality Points

CMKL has adopted the method of assigning a number of "units" for each competency to represent the quantity of work required of students. For the average student, **one credit unit represents one work-hour of time per week throughout the semester**. The number of units in each competency and course is established by the faculty members in consultation with the AiCE program committee.

For example, in a traditional course-based program, a 9-unit semester-long course should require 9 hours of student engagement, on average, including class time; if the instructor requires 3 hours of lecture and 1 hour of recitation, they can expect students to spend 5 hours outside of class engaging in class work. (Note, however, that the AiCE self-directed, competency-based curriculum generally does not "require" class attendance and would rarely if ever involve as much as 3 hours of lecture per week.)

Individual competencies typically have a smaller scope and involve less work than an entire course, and correspondingly, provide fewer units. Estimating the workload for a competency depends on the student's goal for completing the competency. For example, assume that a competency provides 4 credits. If the student sets a goal for completing the competency in five weeks, this implies a work load of (4 *15)/5 or 12 hours of work per week.

Quality Point Average

AiCE students must have a cumulative QPA of at least 2.0 in order to graduate. The cumulative QPA consists of all eligible courses completed as a student at CMKL, up to 400 units. Please see your academic advisor if you need clarification on this policy.

Since AiCE aims for students to demonstrate mastery, the program goal is that every student should get A or B in every course. If a student receives a C or a D, he or she will have the option of repeating the competency learning and assessment, as described earlier. The detailed process will be as follows:

- Students will be informed that their grade is lower than B and asked if they want to accept and record the grade or to try again If student records the grade, this will become the grade on the transcript.
- If a student says they do not want to record, they have the chance to redo the work for the competencies associated with the course and assess again, hopefully receiving a higher grade. In this case, the new grade will appear on the transcript, for the semester in which the work was actually done. The original grade will not be visible to the outside world, though of course CMKL will maintain the history information in its database.
- If the second attempt also results in a grade lower than B, this is the grade that will appear on the transcript, assuming that the competency is required for graduation.
- If the competency is an elective, the student can choose to omit it completely from the transcript. However, in this case, the student may need to undertake additional learning activities in order to reach the minimum credits for graduation.

Academic Probation

When a student's academic performance fails to meet a minimum standard, either for a semester or cumulatively, the student will be put on academic probation.

A first-year student who earns fewer than 27 units per semester, or who has a semester grade point average below 1.75 for either the first or second semester will be placed on academic probation and will receive a letter from the program alerting them. A student in the third or subsequent semester, who earns fewer than 27 units per semester or fewer than 108 units over three consecutive semesters (excluding summers) or who has a semester grade point average below 2.00 will be placed on academic probation. Academic probation status applies only in semesters in which a student has enrolled and registered for competencies. A student who takes a leave-of-absence prior to the beginning of a semester will not be considered for academic probation status.

Academic probation lasts for one semester and constitutes a warning that academic performance does not meet a minimum acceptable level. To be removed from academic probation, a student must demon-

strate that they are making adequate academic progress toward completing graduation requirements. Specifically:

- First year students must achieve a QPA of 1.75 or greater for the second semester and the year as a whole;
- Students in the third or subsequent semesters must achieve a QPA of 2.00 or greater for their next semester and for their cumulative QPA, excluding the first year.

Suspension

Students on probation who fail to improve their academic performance during the semester will be suspended from the program. Specifically, a first year student on probation will be suspended if their semester GPA is below 1.75 or if they earn fewer than 27 credits. Upper class students will be suspended if their semester GPA is below 2.00, if they earn fewer than 27 credits during that semester, or if they have earned fewer than 108 credits over the last three consecutive semesters.

The typical period of academic suspension is two semesters, during which a student on academic suspension is expected to reflect on the circumstances leading up to the suspension, identify the issues that prevented achieving academic success, take actions that address these issues, demonstrate sufficient readiness to return to the university and successfully resume his or her studies.

Two months prior to the end of that suspension period, a student may petition to return to school (on probation) by completing the following steps:

- Writing a formal petition, requesting to return and receiving permission in writing from the AiCE program committee.
- Completing a Return from Leave of Absence form from Enrollment Services; and
- Providing transcripts and clearance forms if the student has been in a program at another college or university even though academic credit earned may not transfer back to CMKL unless prior approval from AiCE program director is given.

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 individualized, self-paced nature of the AiCE program places even more stringent demands on students' integrity. Since much of the student's learning will be self-directed and mastery will be demonstrated 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 competencies, 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 the relevant faculty member if they have specific questions about a competency's academic integrity policy.

Should an instructor believe that an academic integrity violation has occurred, they may consult with the program director, who will assist them 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 expelled 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.

B.Eng in AiCE DEGREE REQUIREMENTS

Overview

AiCE students must satisfy multiple requirements before the Bachelor of Engineering degree is certified.

- They must earn a minimum of 360 credit units in total. (The maximum allowed is 400.)
- The credits they earn must satisfy distribution limits. Specifically, they must earn at least 62 units of arts, humanities, social science and communication electives; 90 units of math/science; 136 units of core technical fundamentals; 38 units of undergraduate research and development outside of XP; and 30 units of experiential learning (XP) including a 12 credit capstone project.
- They must complete all required competencies.
- They must receive an average grade of at least C for soft skills across their first four semesters.

All requirements are expressed via the AiCE competency scheme. Some competencies are required, meaning that every AiCE student must demonstrate this competency in order to graduate. Others are optional. In some cases, optional competencies form a set from which the student is required to select a subset to complete.

Because of the individualized nature of the AiCE program, the pattern of study for each student will be different. Furthermore, students who receive credit upon entry to the program because of advanced placement courses or other prior experience will experience a different learning path than students without these pre-existing skills.

The section below entitled **AiCE Competencies** presents the full set of currently defined competencies and the amount of credit associated with each one, with an indication of whether the competency is required in order to graduate. We expect that this information will change somewhat over time as we develop new academic specialties and adapt to new technology developments.

Undergraduate Research and Development

The AiCE program is designed to provide students with opportunities to solve real world problems in collaboration with external stakeholders from industry, government and/or non-governmental organizations, both domestically and overseas. Starting in their first semester, students will devote at least one day per week to working on projects in three tracks:

- **Entrepreneurship and Innovation**;
- **AI for Society**; and
- **Experiential Learning Program (XP)**

We call this project work "Undergraduate R&D" (URD), though depending on the project, the work may tend more toward research or more toward development. The students are expected to participate for **at least two semesters (18 credits) in each track.** AiCE students must complete **all three tracks** to satisfy their graduation requirement. Because of these requirements, AiCE graduates will have significantly more real-world research and development experience than students who earn bachelor's degrees from most other computer engineering programs.

The projects will be designed by the organizational stakeholders in collaboration with CMKL University faculty; however, students will be encouraged to provide input and suggestions. If they have some original ideas they would like to pursue, students can also propose their own project topics to potential stakeholder organizations.

Every URD project will have at least one advisor. Advisors may be either CMKL faculty members or external experts. Project advisors will assess students on their overall performance in the project, considering effort, productivity, time management, teamwork, communication, and similar professional skills. Other faculty may participate in evaluating project deliverables, including project reports and presentations.

Experiential Learning Program (XP)

The Experiential Learning Program (XP) is a core feature of the AiCE program. It is designed to foster students' personal and professional growth through learning activities conducted outside the classroom. By engaging with stakeholders outside the university and applying their knowledge and creativity to real-world research and application problems, students have the opportunity to develop advanced skills while enhancing their credentials for future employment.

XP is open to AiCE students who have successfully completed their sophomore year and have earned a minimum of 180 credits.

The program encompasses the period from the summer of sophomore year through the spring of senior year. Every AiCE student must earn at least 18 XP credits in order to graduate.

Students involved in XP will engage in various activities as described below. A student can do all activities, during different semesters.

1. **International Study/Research:** Students have the opportunity to study or work on research at overseas educational or research institutions. These experiences provide hands-on learning, cultural immersion, and global networking opportunities. To be eligible for an international placement, students must maintain a minimum 3.0 GPA. Non-native English speakers may need to meet language proficiency requirements specified by host universities. Students are responsible for covering expenses such as accommodation, meals, travel, and incidentals.
2. **Industrial Internship Program:** Our robust industrial internship program offers students an opportunity to gain valuable real-world experience and forge crucial industry connections. Engaging in intensive internships with our esteemed industrial partners including top tech corporations, students acquire practical insights and hands-on skills essential for their professional development. During their participation in this program, students are expected to cover expenses such as accommodation, meals, travel, and incidentals.
3. **Collaborative AI Tech R&D:** The Collaborative AI Tech R&D program allows undergraduate students to engage in cutting-edge research on artificial intelligence-related topics. Through partnerships with the AI Engineering Institute and international collaborators, students gain practical skills and research experience. Opportunities may include co-authoring publications or patents.

All of these activities are expected to complement formal coursework and to provide students with valuable experiences to enhance their academic and professional development.

Capstone Project

In addition to the URD and XP requirements above, all AiCE students must complete a 12 credit capstone design project. Typically, the capstone project will be done during the fourth year of the program, but students who are working toward a three-year accelerated degree will do the capstone project during their third year.

The capstone project is an independent design and prototyping exercise intended to demonstrate that students can apply the skills acquired throughout their years of study. Problems for capstone projects can come from internal or external stakeholders. The stakeholder defines detailed goals, specifications and constraints. The project team must decide how to satisfy these constraints in order to deliver the required functionality. Unlike most URD projects, the advisor provides minimal guidance or knowledge. The project team is expected to do all research necessary in order to fulfill the project specifications.

Capstone project specifications must explicitly state the primary competencies that contribute the necessary knowledge to fulfill the capstone requirements. This should include at least one required competency from each of two pillars.

The capstone project will usually be completed by a team. However, the project must be structured to provide separate deliverables for each team member. One or more CMKL University faculty members will grade the capstone project, focusing on the extent to which the outcomes demonstrate mastery of essential design principles embodied in the identified competencies.

Most students will spend one semester (12 credits) working on the capstone project. However, the curriculum provides the option of a second semester, for projects of larger scope. If a student decides to do two semesters of capstone work, this will usually replace one semester of XP alternatives.

Honors Undergraduate Research Thesis

The AiCE Honors Undergraduate Research Thesis provides an opportunity for students to engage in independent formal research, including literature review, problem formulation, experimentation, analysis, technical writing, and public speaking. Initially, students must write a review of results in their problem area, which forms part of their final thesis. Progress is marked by presenting a poster, giving a short talk, and submitting a progress report after the first semester. Ultimately, students make an oral presentation about their findings and submit a written thesis.

Students must select an advisor, preferably from AiCE faculty, but can also have a co-advisor from another program or from industry. Honors thesis candidates must be in good academic standing. Honors thesis students must enroll in competencies URD-401 and URD-402. Students will be evaluated by the student advisor and two additional experts at the end of each semester.

Note that the honors thesis is not required. It is intended as an option for research-oriented students, especially those expecting to apply to graduate school. It does not replace the Capstone Project.

AiCE COMPETENCIES

The AiCE competencies are organized according to knowledge pillars. Each pillar represents a broad set of topics and concerns. *There are* ***six core pillars*** *in the program:* ***Software Engineering, Artificial Intelligence, Human-Centered Design, Cybersecurity, Scalable Systems and Entrepreneurship and Innovation***. In many cases these major categories are divided into subcategories called knowledge subdomains.

In addition to these central pillars, we also incorporate science, mathematics, humanities, and other competencies, which would normally be viewed as external electives or general education, into our scheme. Additional competencies may be available through AIEI university network and student can request for competency credit transfer through AIEI system.

The tables below list the currently defined competencies for each pillar. We expect to define additional competencies in the future.

Pillar: Artificial Intelligence
Total credits: 86; Required credits: 14 (choose 1 AI Applications)

Subdomain	Code	Competency	Credits	Required
AI Paradigms	AIC-100	Introduction to AI Engineering	2	No
	AIC-101	Introduction to Artificial Intelligence	2	Yes
	AIC-301	Symbolic AI	4	No
	AIC-302	Probability-based Models	4	No
	AIC-303	Planning and Search Strategies	4	Yes
	AIC-305	Bio-inspired AI	4	No
Machine Learning (ML)	AIC-201	Supervised Learning and Unsupervised Learning	4	Yes
	AIC-304	Neural Networks and Deep Learning	4	Yes
	AIC-402	Proximity Measurement and Cluster Analysis	4	No
	AIC-403	Classification and Regression	4	No
	AIC-502	Reinforcement Learning	4	No
	AIC-503	Transformer Networks	4	No
	AIC-505	Generative AI	4	No
Data Handling, Analysis and Mining	AIC-400	Data Wrangling	2	No
	AIC-401	Information Retrieval, Extraction, Search and Indexing	4	No
AI Applications*	AIC-504	Simulation	4	No
	AIC-601	Recommender System	4	No
	AIC-602	Natural Language Processing (NLP)	4	No
	AIC-603	Autonomous Agents	4	No
	AIC-604	Computer Vision	4	No
	AIC-605	Geographic Computing	4	No
	AIC-606	Medical AI and Applications	4	No
	AIC-607	Brain-Computer Interface	4	No

**Students must complete at least one AI Application competency. This may be in the context of undergraduate R&D.*

Pillar: Communication and Presentation
Total credits: 56; Required credits: 10

Subdomain	Code	Competency	Credits	Required
Communication and Presentation	COM-100	Writing Foundations	2	Yes
	COM-101	Technical Writing	4	No
	COM-102	Creative Writing	8	No
	COM-103	Graphics and Visual Storytelling	8	No
	COM-104	Fundraising & Pitching	4	No
	COM-105	Presentation and Storytelling	8	Yes

	COM-108	Academic Writing & Research	8	No
	COM-109	Communicating with Data	4	No
	COM-201	Improvisational Acting	6	No
	COM-202	Instructional Design	4	No

Pillar: Entrepreneurship and Innovation
Total credits: 104; Required credits: 8 (Choose 1 Business Application Domains)

Subdomain	**Code**	**Competency**	**Credits**	**Required**
Entrepreneurship Fundamentals	ENI-100	New Venture Design	8	Yes
	ENI-103	Product Design and Development	2	No
	ENI-104	Intellectual Property (IP) Law	2	No
	ENI-106	Team Building for Startups	2	No
	ENI-107	Entrepreneurial Finance and Accounting	4	No
	ENI-109	Project Management	4	No
	ENI-110	Startup Regulations	2	No
Strategic Innovation	ENI-202	Business Strategy	4	No
	ENI-204	Business Analytics	4	No
	ENI-213	Digital Marketing	4	No
	ENI-304	AI for Business Solutions	4	No
Startup Genesis	ENI-601	Startup Studio: Venture Creation	16	No
	ENI-602	Startup Studio: Venture Launch	16	No
Business Application Domains	ENI-401	Retail and Services Applications	4	No
	ENI-402	Logistics	4	No
	ENI-403	Biomedical, Bioinformatics and Health**	4	No
	ENI-404	Agriculture	4	No
	ENI-405	Fintech**	4	No
	ENI-406	Educational Technology	4	No
	ENI-407	Gaming	4	No
	ENI-408	Manufacturing	4	No

***Competencies can be counted toward math and science requirements. Other scientific application domains proposed by students or stakeholders may also provide math/science credits.*

Pillar: Humanities, Arts and Social Sciences
Total credits: 93

Subdomain	Code	Competency	Credits	Required
People, Places and Cultures	HAS-101	Sociology and Cultural Anthropology	9	No
	HAS-102	Social Psychology	9	No
	HAS-103	Political Studies	9	No
	HAS-104	Human Geography	9	No
	HAS-105	Global Histories	9	No
	HAS-109	Ethics and Policy Issues	2	No
	HAS-110	Policy & Sustainable Development	6	No
	HAS-113	AI and Computer Engineering for Community Impact I	4	No
	HAS-123	AI and Computer Engineering for Community Impact II	4	No
	HAS-133	AI and Computer Engineering for Community Impact III	4	No
	HAS-143	AI and Computer Engineering for Community Impact IIII	4	No
Economics	HAS-107	Principles of Economics	8	No
	HAS-108	Behavioral Economics	8	No
Arts and Music	HAS-106	History of Visual Arts	8	No

Pillar: Human-Centered Design
Total credits: 154; Required credits: 8

Subdomain	Code	Competency	Credits	Required
Game Design	HCD-532	Game Design	6	No
	HCD-533	Narrative Design	6	No
	HCD-534	Sound Design	6	No
Engaging in Critical Oversight	HCD-201	Ethics in computer engineering	2	Yes
	HCD-202	Ethical Principles for AI (Fairness, Accountability, Transparency, Ethics)	4	No
	HCD-203	Creating Explainable AI	4	No
Game Engineering	HCD-541	Game Engines I (Fundamentals)	6	No
	HCD-542	Game Engines II (Programing Complex Mechanics)	6	No
	HCD-543	Crowd AI (Simulating Group Behavior in Games)	6	No
	HCD-544	Character AI (Designing Believable Game Agents)	6	No
Game Studio	HCD-490	Game Prototype Studio (From Concept to Playable Demo)	4	No
	HCD-491	Game Production Studio I (Polishing Your Game Project)	8	No

Subdomain	Code	Competency	Credits	Required
	HCD-492	Game Production Studio II (Release Ready Game)	8	No
Digital Media & 3D Content	HCD-311	Digital Arts	2	No
	HCD-312	Algorithmic and Generative Arts	4	No
	HCD-513	Visual Development (Concept Art and Production Design)	6	No
	HCD-514	Visual Storytelling (Storyboarding and Animatics)	6	No
	HCD-521	3D Modeling	6	No
	HCD-522	3D Appearance (Surfacing, Lighting, and Rendering)	6	No
	HCD-523	3D Animation (Rigging and Animating)	6	No
	HCD-524	Motion Capture	6	No
	HCD-525	Digital Post-Production	6	No
	HCD-526	Visual Effects (VFX)	6	No
Human-Computer Interaction (HCI)	HCD-101	Visualization	4	Yes
	HCD-501	Accessibility & Universal Design	2	Yes
	HCD-502	User Experience Design	6	No
	HCD-503	Psychology and Research Methods in UX	4	No
	HCD-545	Virtual Reality (VR)	6	No
	HCD-546	Augmented Reality (AR) and Mixed Reality (MR)	6	No

Pillar: Mathematics
Total credits: 76; Required credits: 48

Subdomain	Code	Competency	Credits	Required
Mathematics for AI*	MAT-202	Signal Processing and Data Domains	4	No
	MAT-203	Descriptive Statistics	2	Yes
	MAT-204	Introduction to Probability	3	Yes
	MAT-205	Probability Distributions	3	Yes
	MAT-206	Statistical Inference	4	Yes
	MAT-208	Vector Spaces	4	Yes
	MAT-209	Matrices	4	Yes
	MAT-210	Linear Systems	4	Yes
	MAT-211	Logic and Sets Theory (Discrete Math 1)	3	Yes
	MAT-212	Combinatorics (Discrete Math 2)	3	Yes
	MAT-213	Number Theory (Discrete Math 3)	3	Yes

Subdomain	Code	Competency	Credits	Required
	MAT-214	Graph Theory (Discrete Math 4)	3	Yes
Calculus	MAT-100	Differential Calculus	4	Yes
	MAT-103	Integral Calculus	4	Yes
	MAT-104	Introduction to Optimization	4	Yes
	MAT-105	Vector Calculus	6	No
	MAT-106	Analytical Geometry	6	No
	MAT-108	First-Order Differential Equations	4	No
	MAT-109	High-Order Differential Equations	5	No
	MAT-110	Numerical Methods for Differential Equations	3	No

**Students must complete a total of 90 credits of math and science competencies. This includes 48 required credits of the Mathematics for AI competencies as well as some other designated competencies within the six main pillars.*

Pillar: Science
Total credits: 60

Subdomain	Code	Competency	Credits	Required
Science*	SCI-103	Quantum Mechanics	6	No
	SCI-104	Quantum Computing	6	No
	SCI-105	Kinematics: describe motion (Physics I)	3	No
	SCI-106	Dynamics: explain motion (Physics I)	3	No
	SCI-107	Energy and Momentum (Physics I)	3	No
	SCI-108	Thermodynamics (Physics I)	3	No
	SCI-109	Electricity (Physics II)	4	No
	SCI-110	Magnetism (Physics II)	4	No
	SCI-111	Light and Optics (Physics II)	4	No
	SCI-120	Biology for AI and Engineering	6	No
	SCI-121	Medical Science for AI Engineering	6	No
	SCI-130	Chemical Foundations	6	No
	SCI-131	Chemical Dynamics	6	No

**Students must complete a total of 90 credits of math and science competencies.*

Pillar: Software Engineering
Total credits: 102; Required credits: 22

Subdomain	Code	Competency	Credits	Required
Programming Fundamentals	SEN-101	Algorithmic Thinking & Problem Solving	2	Yes
	SEN-102	Introduction to Programming	6	Yes
	SEN-103	Programming Multi-module Applications	4	No
	SEN-107	Fundamental Data Structures and Algorithms	6	Yes

Subdomain	Code	Competency	Credits	Required
	SEN-109	Modern Systems Programming	2	Yes
	SEN-208	Advanced Data Structures and Algorithms	6	No
	SEN-209	Designing and Implementing Databases	6	No
Programming Paradigms	SEN-304	Object Oriented Design and Programming	6	No
	SEN-305	Functional Programming	4	No
	SEN-306	Dataflow Programming	4	No
	SEN-307	Domain-specific programming languages	2	No
Software Development and Maintenance (SDM)	SEN-201	Software Engineering Processes	6	Yes
	SEN-202	Software Quality Assurance	6	No
	SEN-203	Software Design	4	No
	SEN-205	Requirements Analysis and Problem Definition	2	No
	SEN-210	Designing and Implementing User Interfaces	4	No
	SEN-212	Software Configuration Management	2	No
	SEN-213	Software Measurement	2	No
	SEN-214	Software Maintenance and Evolution	2	No
	SEN-301	Designing and Building Secure Software	4	No
	SEN-302	Designing and Building Mission Critical Software	2	No
Platform Specific Architectures	SEN-311	Web Architectures	4	No
	SEN-312	Mobile Application Architectures	4	No
Software Engineering Leadership	SEN-401	Agile Development Processes (including DevOps)	2	No
	SEN-402	Software Project Management	4	No
	SEN-403	Software Organization Maturity and Continuous Improvement	2	No
	SEN-404	Legacy Software Strategies	2	No
	SEN-405	Open Source Software	2	No

Pillar: Cybersecurity
Total credits: 42; Required credits: 8

Data Acquisition, Management, and Governance	SEC-101	Data and Information Fundamentals	2	Yes
	SEC-102	Data Reduction and Compression	4	No
	SEC-103	Data Governance	2	No
Privacy, Security and Integrity	SEC-201	Data Privacy, Security and Integrity	4	Yes
	SEC-203	Securing System Infrastructure	4	No
	SEC-204	Security Policy and Processes	4	No
	SEC-205	Distributed ledger and Blockchain	4	No
	SEC-303	Vulnerability Assessment for Software Applications	4	No
	SEC-401	Privacy Attacks	2	No
	SEC-402	Differential Privacy (DP)	6	No
AI System Security	SEC-301	Security Challenges in Modern AI Systems	2	Yes
	SEC-302	Robustness of AI Components and Systems	4	No

Pillar: Scalable Systems
Total credits: 54; Required credits: 12

Subdomain	**Code**	**Competency**	**Credits**	**Required**
Computer Organization	SYS-101	Operating Systems	4	Yes
	SYS-102	Basic Computer Architecture	4	Yes
	SYS-202	Real Time Operating Systems	4	No
	SYS-205	Storage and File Systems Fundamentals	2	No
	SYS-206	Computer Design Processor Architectures and Digital Design	4	No
	SYS-207	Networks	4	No
	SYS-208	Digital and Analog Circuit Design	4	Yes
Distributed Systems	SYS-301	Cyber Physical Systems	4	No
	SYS-302	Cloud Computing	4	No
	SYS-303	Scalable Management of Data and Models	4	No
	SYS-304	Scalable Algorithms and Infrastructure	4	No
	SYS-401	Parallel Computing	4	No
	SYS-402	Distributed Data Storage	4	No
	SYS-403	Big Data Computing	4	No

Pillar: URD Undergraduate Research, Development and Practice
Total credits: 152; Required credits: 68

Subdomain	Code	Competency	Credits	Required
Entrepreneurship and Innovation	URD-100	Time Management	2	Yes
	URD-101	Undergraduate R&D Project (1)	9	Yes
	URD-102	Undergraduate R&D Project (2)	9	Yes
AI and Computer Engineering for Society	URD-201	Undergraduate R&D project (3)	9	Yes
	URD-202	Undergraduate R&D Project (4)	9	Yes
Experiential Learning (XP)*	URD-301	Undergraduate R&D Project (5)	9	No *
	URD-302	Undergraduate R&D Project (6)	9	No *
	URD-311	Overseas Colleges (1)	9	No *
	URD-312	Overseas Colleges (2)	9	No *
	URD-321	Industrial Internship (1)	9	No *
	URD-322	Industrial Internship (2)	9	No *
Senior Research & Development	URD-401**	Honors Undergraduate Research Thesis (1)	12	No
	URD-402**	Honors Undergraduate Research Thesis (2)	12	No
	URD-411	Undergraduate Capstone Project (1)	12	Yes
	URD-412	Undergraduate Capstone Project (2)	12	No
Summer Research	URD-103	Summer Research (1)	4	No
	URD-203	Summer Research (2)	4	No
	URD-303	Summer Research (3)	4	No

**To be eligible for the XP competencies enrollment, AiCE students must have completed their sophomore year and earned at least 180 credits. AiCE students must earn at least 18 XP credits.*
***URD-401 and URD-402 are intended for AiCE students who are planning to continue to graduate studies. Read more about "Honors Undergraduate Research Thesis" on page 33*

Pillar: Soft Skills

Students do not sign up for the competencies under the "soft skills" pillar. However, all students are required to demonstrate these competencies during their undergraduate career. Usually, soft skills will be evaluated by instructors or industry mentors as part of the student's work on projects or undergraduate R&D. Students are required to achieve a minimum of "Apprentice" level of mastery in all soft skills competencies to be eligible for graduation.

To facilitate this evaluation, the full AiCE curriculum model breaks down each of these soft skill competencies into a set of observable behaviors that will allow objective assessment of the degree to which the students demonstrate these competencies.

Subdomain	Code	Competency & Skills	Required
Soft Skills	SOF-101 SOF-102 SOF-103 SOF-104	**Adaptability** – Creative flexibility – Working flexibility	Yes
	SOF-201 SOF-202 SOF-203 SOF-204	**Empathy** – Human-centered focus – Respect for diversity	Yes
	SOF-301 SOF-302 SOF-303 SOF-304	**Ethics** – Social consciousness – Honesty – Fairness – Respect for privacy and confidentiality	Yes
	SOF-401 SOF-402 SOF-403 SOF-404	**Proactiveness** – Service orientation – Continuous improvement focus	Yes
	SOF-501 SOF-502 SOF-503 SOF-504	**Professionalism** – Responsibility – Compliance with organizational norms – Time management – Quality focus – Professional awareness – Interpersonal relations	Yes
	SOF-601 SOF-602 SOF-603 SOF-604	**Self-Learning** – Motivation to learn – Active learning	Yes
	SOF-701 SOF-702 SOF-703 SOF-704	**Teamwork** – Attention – Respect and courtesy – Openness – Team spirit	Yes

Creating a Study Roadmap for a Semester

Each student will work with their faculty advisor to choose and schedule an individual set of competency goals for each semester. In the first year, students will be encouraged to focus on the required competencies in the six core pillars, but there will also be room for non-required competencies and non-engineering competencies to satisfy the distribution requirements. Students will also start an undergraduate R&D project in the first semester.

Most competencies are associated with 4 to 6 credits. This suggests that a student should spend 4 to

6 hours per week on that competency, if he or she was planning to work on that competency for an entire semester. In most cases, though, we expect students to work on competencies more intensely, but over a shorter time period. This will allow the student to concentrate on 4 or 5 competencies for four to six weeks, then switch to new competencies, rather than juggling a larger number of competencies throughout the semester.

Students can build a study plan that fits their working and learning styles, as well as their prior background. In particular, students who already possess some of the skills that define a competency can choose to do the assessment for that competency immediately, without spending any time on actual study.

Students are advised to take 45 credits per semester for a 4-year study plan and 60 credits per semester for a 3-year accelerated study plan due to the intensity of these programs. We acknowledge, however, that our student body is unique, and this includes how each student manages their study load. While students may register for the maximum number of units per semester, we strongly advise students to take no more than 60 units per semester. Students who would like to take more than 60 units must consult with the faculty advisor to get approval. As part of this consultation process, these students will be required to explain their reasons for overloading and to develop a plan for dealing with the increased load.

Three-year Accelerated Study Plan

Our three-year accelerated study plan offers an opportunity for qualified and capable students to complete their AiCE undergraduate degree in a shorter timeframe. By condensing the program, students can earn a baccalaureate degree in just three years.

To accelerate their study progress, students can utilize pre-matriculant credits earned through Advanced Placement, International Baccalaureate, or college courses taken during high school. These credits are considered for transfer, provided the student has a cumulative grade point average of at least B (equivalent to 3.0 on a 0-4 scale). Additionally, each course intended for transfer to CMKL must have a minimum grade of B.

Furthermore, our program warmly welcomes applicants with Higher National Certificates (HNCs) and Higher National Diplomas (HNDs) qualifications in Computing at a Merit profile or higher. This provides an excellent pathway for these students to continue their education with us.

Finally, students who due to their previous experience have relatively advanced skills in specific competencies are encouraged to contact the competency instructors about the possibility of immediate, alternative assessment activities. Students who can demonstrate completion of relevant external projects may also be eligible for immediate credit. Decisions regarding this kind of earned credit rests with the instructor, in consultation with the program director.

INTEGRATED B.ENG./M.S. in AiCE

CMKL offers an Integrated Masters and Bachelors program (IMB program) for students who excel academically. A student can earn both a bachelor and a masters degree in AiCE without having to apply separately. As a result, there will be no application cost, and no GRE (Graduate Record Examinations) requirement.

Students who are interested in the IMB program can apply in the second semester of their junior year (3^{rd} year) in AiCE. To be eligible for IMB at this stage, they must have finished at least 270 units and have a 3.00 QPA or higher. Students must go to an IMB information session and sign a declaration form in order to be formally admitted. Students can register at that session if they meet all of the prerequisites for the IMB program. For students who satisfy all prerequisites, the application deadlines for the IMB program are the end of November for the fall semester and the end of April for the spring semester.

Undergraduate students in their final semester with a QPA of 2.50 to 2.99 may also be allowed to enter the IMB program under certain circumstances. Students in this situation who wish to join IMB must submit a petition to their undergraduate advisor by March 31 to enter in the spring semester and October 31 for the fall semester.

A student in the IMB program may be working on both undergraduate and graduate competencies or courses at the same time. However, the B.Eng. degree takes precedence over the masters degree when a

course is required to fulfill the requirements for both. Furthermore, a student must have satisfied all the requirements for the B.Eng. before the masters degree can be awarded if adequate progress toward.

Some courses may require that a student have graduate student status. In particular an IMB student can only register for the graduate version of a research project in their final year of the IMB program, and with written permission from their research instructor verifying the work is of a level of rigor appropriate for masters degree students.

Professional M.S. in AiCE degree requirements

Please see the M.S. in AiCE section for the requirements for the M.S. degree. For students in the AiCE IMB program, all requirements for the Professional M.S. degree are in addition to the requirements for the B.Eng. in AiCE. Students will be committed to the M.S. curriculum requirements that exist at the time that they sign their declaration form.

Residency requirements and financial impacts

A student in the IMB program may enroll in graduate program (Masters) after satisfying all of the requirements for the B.Eng. degree. In order to accomplish this, the student's undergraduate degree is validated, and they are now formally awarded the B.Eng. degree. No more competences or courses may be used to fulfill the requirements for the B.Eng. degree once a student's undergraduate degree has been certified.

A student must be a graduate student for at least one semester before receiving their diploma if it takes them more than 8 semesters to finish both their B.Eng. and M.S. degrees.

Undergraduate students who are interested in moving to graduate status should consult with their academic advisor to plan a course schedule and to determine the most appropriate timing. The timing for becoming a graduate student can affect financial aid. When a student is a graduate student through the IMB program, the department is able to provide some financial assistance through Teaching Assistantships.

EXCHANGE AND TRANSFER PROGRAMS

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 the competency transfer directly using 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 AiCE program requirements and be enrolled at least four semesters at CMKL University to receive a CMKL degree.

POST-MATRICULATION GUIDELINES

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.

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.

"Grandfather" Policy

New rules will be added to the department policies for improvement when necessary. These changes will be discussed with students before implementation. Students who matriculated in the program before the new policies will be governed by the grandfather policies if they are affected by the changes in degree requirements/course offerings.

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: `https://www.cmkl.ac.th/cube/financial-services/overview`

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

Tuition Billing and Payments

The cost of tuition for students enrolling in AiCE programs is decided in the spring for the class that will start in the fall semester after that. The second autumn semester tuition for a student will probably go up in line with the tuition increase for the next academic year. The cost of tuition will rise by roughly 3-5% yearly.

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 all transactions processed in the month, as well as any charges due in the future. Students receive an email notification to their CMKL email account when an invoice is ready for viewing on the Cube system. 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 1.5% interest charge each month until the balance is paid in full.

CONCLUSION

CMKL University is ready to welcome promising and proactive students 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. Should you have any questions or concerns, please do not hesitate to contact us.

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APPENDIX A : AP/ IB / A-Level Credit Awarding Guidelines

This appendix specifies details of the grades or scores required of students who have completed Advanced Placement, International Baccalaureate and GCE A-Level studies and wish to be awarded transfer credit within the AiCE program.

AP/ IB / A-Level Credit Awarding Guidelines			
CMKL Competencies	**IB**	**AP**	**A-Level**
***Humanities, Arts and Social Sciences:* People, Places, Cultures (9)**			
Global Histories	IB: History (Score: 7)	AP: World History (Score:5)	-
Sociology & Cultural Anthropology	IB: Social & Cultural Anthropology (Score: 6 or 7)	AP: Social & Cultural Anthropology (Score: 4 or 5)	A-Level: Sociology (Score: B or A)
Human Geography	IB: Geography (Score: 6 or 7)	AP: Human Geography (Score: 4 or 5)	A-Level: Geography (Score: B or A)
Political Studies	IB: Global Politics (Score: 7)	AP: Government & Politics: Comparative (Score: 4 or 5)	-
Social Psychology	IB: Psychology (Score: 6 or 7)	AP: Psychology (Score: 4 or 5)	-
***Human-Centered Design:* UX Design (10)**			
User Experience Design	IB: Design Technology (Score: 6 or 7)	-	-
***Humanities, Arts and Social Sciences:* Economics (8)**			
Behavioral Economics	IB: Economics (Score: 6 or 7)	AP: Economics Micro and Macro (Score: 5)	A-Level: Economics (Score: A)
***Mathematics:* Differential and Integral Calculus (12)**			
Differential Calculus (4), Integral Calculus (4), Introduction to Optimization (4)	IB: Mathematics HL (Score: 6)	AP: Calculus AB and sub score (Score: 5)	A-Level:Mathematics C/Advanced Math (Score:B)
***Mathematics:* Vector Calculus and Analytical Geometry (12)**			
Vector Calculus (6), Analytical Geometry (6)	IB: Mathematics HL (Score: 7)	*AP: Calculus BC (Score: 5)	*A-Level: Mathematics C/ Advanced Maths (Score: A)

*Note - Students will be awarded credits for Differential Calculus, Integral Calculus, Introduction to Optimization, Vector Calculus, and Analytical Geometry if they receive an A grade for A-Level: Mathematics C/Advanced Math or a score of 5 in AP: Calculus BC.			
***Science:*Physics for Engineering students (12)**			
Physics I for Engineering Students: Kinematics: describe motion (3), Dynamics: explain motion (3), Energy and Momentum (3), Thermodynamics (3)	IB: Physics (Score: 7)	AP: Physics C–Mechanics (Score: 5)	*A-Level: Physics/Advanced Physics (Score: B or A)
Physics II for Engineering Students: Electricity (4), Magnetism (4), Light and Optics (4)	-	AP: Physics C – Electricity and Magnetism (Score: 5)	*A-Level: Physics/Advanced Physics (score A)
*Note- Students who earn an A grade in A-Level Physics/Advanced Physics will receive credits for Physics I for Engineering Students and Physics II for Engineering Students.			
***Science:* Biology or Chemistry (12)**			
Biology for AI and Engineering (6) & Medical Science for AI Engineering (6)	IB: Biology (Score: 6)	AP: Biology (Score: 5)	A-Level: Biology/ Advanced Bio (Score: B)
Chemical Foundations (6) & Chemical Dynamics (6)	IB: Chemistry (Score: 7)	AP: Chemistry (Score: 5)	A-Level: Chemistry/ Advanced Chemistry (Score: A)
***Software Engineering:* Fundamentals of Programming (8)**			
Fundamentals of Programming : Algorithmic Thinking & Problem Solving (2) Intro to Programming (6)	IB: Computer Science (Score: 6 or 7)	AP: Computer Science A (Score: 5)	A-Level: Computer Science (Score: A)

Questions about CMKL's AP/ IB/ A-Level Credit Policy may be directed to the University Registrar's Office at cmklregistrar@cmkl.ac.th

AI + COMPUTER ENGINEERING

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