

**Doctor of Philosophy in
Computer Science and Information Systems
Revised Program 2025**

Name of the Institute: National Institute of Development Administration
School Name: School of Applied Statistics

Part 1 Program Title & Course Management System
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1. Name of the Program

Name in English: Doctor of Philosophy Program in Computer Science and Information Systems (International Program)

Name in Thai: หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาวิทยาการคอมพิวเตอร์และระบบสารสนเทศ (หลักสูตรนานาชาติ)

2. Name of the Degree

Full Name: Doctor of Philosophy (Computer Science and Information Systems)

ชื่อเต็ม: ปรัชญาดุษฎีบัณฑิต (วิทยาการคอมพิวเตอร์และระบบสารสนเทศ)

Abbreviated Name: Ph.D. (Computer Science and Information Systems)

ชื่อย่อ: ปร.ด. (วิทยาการคอมพิวเตอร์และระบบสารสนเทศ)

3. Major subject or area of expertise

3.1 Computer Science

3.2 Information Systems

4. Characteristic of the Program

4.1 Character: Doctorate degree follows the standard of higher education program B.E. 2565

4.2 Language used in the program: English

4.3 Student Admission: The program allows both Thai and international students to study in the program. Students with a master's degree in computer science, Information Systems, Computer Engineering, Information Technology, and related fields are qualified. Due to this is an international program, students who graduated from the institutes, both in Thailand and from other countries, which have been accredited by the Commission on Higher Education (CHE) and have a good English literacy (as announced by NIDA Academic Committee). In addition, students with experience more than 10 years with bachelor's degree and/or master's degree in other field besides computer science, Information Systems, Computer Engineering, Information Technology, and related fields also are allowed to study.

a. In case the prospective student has experience less than 10 years, the master's degrees hold must be related to Computer Science and information systems areas.

b. In case the prospective student has experience of more than 10 years in the Computer Science and information systems area, any master's degree earned is qualified.

c. In case of applying in Plan 2 (2.2), the prospective student with bachelor's degree hold related to computer science and information systems areas is qualified.

4.4 Cooperation with Other Institute: Universities and Institutes having academic discipline-related Memorandum of Understanding with NIDA and other form of academic cooperation.

4.5 Degree Granted: Students who graduated from both major will be presented the same degree

5. The status of Program's Curriculum and the Consideration for Approval/Endorsement of the Program's Curriculum

The program is a Doctor of Philosophy program in Computer Science and Information Systems, revised for beginning to use in the first semester of academic year 2025. After passing the approval from the NIDA's academic committee, the program would be granted the permission to use from the NIDA's academic senate (council) before starting the admission process.,

The program has accepted the permission from the NIDA's academic committee meeting no.9/2024 on September 30, 2024.

The program has been granted to be used by the NIDA's academic senate (council) meeting no.10/2024 on October 16, 2024.

6. Studying Place

Navamindradhiraj's building, 12th floor, National Institute of Development Administration, Bangkok, Thailand

7. Collaboration with other programs within school and other programs from other schools and institutes in NIDA

Students are allowed to take courses opened by other academic programs in NIDA for enhancing the knowledge background and ability for self-studied and fulfill the requirements for completing this program, such as English from the school of Language and Communications. However, the students must conform to the requirements of the curriculum and must receive the approval from the advisor and the instructor. Due to the interdisciplinary concept, the program allows other students enrolled in other programs from other schools in NIDA to take courses opened by the program also. Moreover, there is an opportunity that allows prospective students who do not enrolled in any programs opened in NIDA to take some of credited courses to upskill and reskill themselves.

8. Education Management System

8.1 System: The program is arranged to give education to enroll students using 19-week bi-semester system. According to the education quality concern standard and regulation of the NIDA, for normal semester, the student must enroll not less than 9 credits and not more than 15 credits.

8.2 Summer Semester's Educational Management System: If necessary, remedial courses will be provided during the summer semester, which is 8 weeks long. For the summer session, the student cannot enroll more than 6 credits.

8.3 The comparable credits among the education management systems

For 1 credit, it requires 15 hours for educating time. Based on current NIDA's education rules and related orders, students can transfer credits from other education management systems beside bi-semester system by calculating from number of hours studied; however, there is a need to consider the course description for considering the content studied whether it strengthens the educational background of the students and conforms to the requirement of the program's curriculum.

8.4 Semester Period for teaching

The first semester normally begins at the first week of August; while the second semester begins at the first week of January. Summer session is during June and July. Normally, the program will provide teaching classes during daytime.

8.5 Education Management Pattern and Format

- In class session during work-day from Monday to Friday.
- on-line session by arrangement not exceed 60% as specified by the institution.

9. 5-year Plan for Student Admission and Students' Graduation

Plan 1 (1.1) 48 Credits

Year	Academic 2025	Academic 2026	Academic 2027	Academic 2028	Academic 2029
Year 1	2	2	2	2	2
Year 2	-	2	2	2	2
Year 3	-	-	2	2	2
Total	2	4	6	6	6
Estimated graduate students	-	-	2	2	2

Plan 2 (2.1) 48 Credits

Year	Academic 2025	Academic 2026	Academic 2027	Academic 2028	Academic 2029
Year 1	2	2	2	2	2
Year 2	-	2	2	2	2
Year 3	-	-	2	2	2
Total	2	4	6	6	6
Estimated graduate students	-	-	2	2	2

Plan 2 (2.2) 72 Credits

Year	Academic 2025	Academic 2026	Academic 2027	Academic 2028	Academic 2029
Year 1	1	1	1	1	1
Year 2	-	1	1	1	1
Year 3	-	-	1	1	1
Year 4	-	-	-	1	1
Year 5	-	-	-	-	1
Year 6	-	-	-	-	-
Total	1	2	3	4	5
Estimated graduate students	-	-	-	1	1

10. Budget plan

The budget will be provided by the government and revenue of the National Institute of Development Administration.

Estimated expend of student per year	Regular Program
A student per year	110,000 Baht

11. Prospective student's qualification

- must graduate and receive at least one bachelor's degree or master's degree from any university or college accredited by **Ministry of Higher Education, Science, Research and Innovation (MHESI)** and have a good English literacy referring to NIDA's announcement.

a. In case the prospective student has experience less than 10 years, the master's degrees hold must be related to Computer Science and information systems areas.

b. In case the prospective student has experience of more than 10 years in the Computer Science and information systems area, any master's degree earned is qualified.

c. In case of applying in Plan 2 (2.2), the prospective student with bachelor's degree hold related to computer science and information systems areas is qualified.

12. Fulfilled Job Positions

- Academic faculties/professors/scholars
- Researchers
- Consultants in Digital Technology areas
- IS auditors and IT auditors
- Executive Officers in Information Systems, Information Technology, and Information Security areas.

Part 2 Philosophy, Objectives and Expected Learning Outcome

1. Program's Philosophy

The program allows students with MS. degree in CSIS or related field to study in non-coursework plan to reduce the graduation time for accelerating to work in the industry. The program also allows students with MS. Degree in other disciplines with the working experience at least 10 years to study to support the aging society and promote the life-long learning. The students will catch up the research and technology trend with a lot of seminar courses and real-problem cases. Moreover, to respond to the requirements of the industry need more graduates to enter the industry quickly, the program allows the students with BSc. In CSIS or related field to study which will receive both MS. and Ph.D. degree when obtaining all requirements for graduation.

2. Program's Objectives

To develop and create students with abilities that

- 1) can create and deliver a new knowledge in computer science and information systems areas,
- 2) can apply the knowledge to increase organization performance, which would lead to overall country growth and development, and
- 3) can analyze, evaluate, develop, and innovate tools, processes and methodologies using knowledge in computer science and information systems areas that help complying the related laws, regulations, standards, and industry requirements.

3. Learning Outcomes of Program

According to the fulfilled job position, laws and regulation standards, industry requirement, and professional association recommendations, the Ph.D. CSIS's knowledge, skill, ethic, and character are shown in Table 1.

Table 1 CSIS professional qualifications

Computer Science	Information System
Knowledge K1 Theory Foundation K2 Programming Languages K3 Databases K4 Systems and Networks K5 Software Engineering K6 Cybersecurity K7 Artificial Intelligence and Machine Learning K8 Emerging Technologies K9 Human-Computer Interaction	Knowledge K1 Theoretical Foundation K2 Research Methodologies K3 Data Management K4 Information Technology K5 System Design and Development K6 Cybersecurity K7 Business Process K8 Emerging Trends
Skills S1 Research Skills S2 Problem Solving S3 Communication Skills S4 Critical Evaluation S5 Project Management	Skills S1 Analytical Skills S2 Problem Solving S3 Communication Skills S4 Critical Thinking S5 Technical Proficiency
Ethics E1 Ethical and Professional Standards	Ethics E1 Ethical Understanding
Character C1 Adaptability C2 Collaboration and Teamwork	Character C1 Leadership C2 Collaboration

The mapping Program Learning Outcome with Program's Philosophy, Program's Objective, CHE PQS, and Functional PQS are shown in Table 2.

Table 2 The mapping Program Learning Outcome with Program's Philosophy, Program's Objective, TQF, and Functional PQS

Program Learning Outcome	Program's Philosophy	Program's Objective	TQF	Functional PQS	
				Computer Science	Information System
PLO 1: Demonstrate deep knowledge and expertise in a specific area of Computer Sciences and Information Systems For CS, the students demonstrate deep knowledge in CS field such as algorithms, artificial intelligence, machine learning, HCI, cyber security or software engineering. For IS, the students demonstrate deep knowledge about	1.1, 1.2 (1.2.3, 1.2.5)	3	Knowledge	K1-9	K1-8

Program Learning Outcome	Program's Philosophy	Program's Objective	TQF	Functional PQS	
				Computer Science	Information System
information systems theories, models, and frameworks such as data management, system design and development, cyber security, business process, or information technology.					
PLO 2: Conduct original research that contributes new knowledge or innovations to the field. Master a variety of research methodologies.	1.1, 1.2 (1.2.2, 1.2.4, 1.2.5, 1.2.6)	1, 2	Skills	S1-2, S4, C1	K2, S1-2, S4
PLO 3: Apply advanced analytical and critical thinking skills to complex problems and theoretical questions.	1.1, 1.2 (1.2.4, 1.2.5)	3	Skills	S2-5, C1	S1-2, S4

Program Learning Outcome	Program's Philosophy	Program's Objective	TQF	Functional PQS	
				Computer Science	Information System
PLO 4: Produce high-quality academic papers, research reports, and documentation and deliver clear and compelling presentations of research findings to diverse audiences, including academic peers and non-specialists.	1.1, 1.2 (1.2.2, 1.2.6)	1, 2	Skills	S3, S5, C2	S3, S5, C2
PLO 5: Adhere to ethical guidelines and best practices in conducting research, including issues related to data privacy, consent, and responsible use of technology.	1.1, 1.2 (1.2.6)	2, 3	Ethics	S1, E1, C1	S1, E1, C1
PLO 6: Engage in transdisciplinary	1.1, 1.2 (1.2.4, 1.2.6)	1, 2, 3	Character	S5, C1-2	E1, C1-2

Program Learning Outcome	Program's Philosophy	Program's Objective	TQF	Functional PQS	
				Computer Science	Information System
research and collaboration, integrating knowledge from other fields to address complex problems.					

Part 3 Curriculum Structures, Courses and Credits

This program provides a combination of coursework and research activities. Coursework provides fundamental knowledge and includes courses on research methodology, data analysis techniques, and background research knowledge. Coursework also includes communication courses to increase the ability to read, write, and speak, so the scholars should have ability to teach and conduct the digital transformation in organization. They should be able to deal with the development, deployment, use, and impact of digital technology in business organizations as well as in society.

The students can choose not to take any courses; however, they must pass the qualify examination, which will evaluate their fundamental knowledge for further move to do research in Computer Science and information systems.

To begin the research activities, the students are suggested to enroll in the preliminary requirements to broaden their research background and demonstrate the ability to integrate the body of knowledge by taking three seminar courses provided and obtaining at least B level grade. Along with passing the qualify examination and preliminary requirements, the students can proceed to submit their dissertation proposals to their dissertation committee. Students are expected to give a final dissertation presentation before their final dissertation submission. The dissertation must be advertised on the school's website. To complete the program requirements for graduation, the students Plan 1 (1.1) and Plan 2 (2.2) must publish their dissertation results in an international journal listed in the database announced by CHE for at least two papers. The students Plan 2 (2.1) must publish their dissertation results in an international journal listed in the database announced by CHE for at least one paper.

1. Total Credits:

48 credits for the students studying in plan 1 (1.1) Dissertation only.

48 credits for the student studying in plan 2 (2.1) Dissertation and coursework.

72 credits for the student studying in plan 2 (2.2) Dissertation and coursework.

Remarks: Student s who have earned a master's degree are allowed to study in Plan 1 (1.1) and Plan 2 (2.1)

Students who graduated a bachelor's degree are allowed to study in Plan 2 (2.2) only.

2. Curriculum Structure

Courses	Plan 1 (1.1)	Plan 2 (2.1)	Plan 2(2.2)
Remedial courses	6 credits (Non-credit)	6 credits (Non-credit)	6 credits (Non-credit)
Foundation courses	-	-	2 credits
Core courses	-	-	3 credits
Major courses	-	-	9 credits
Elective courses	-	3 credits	1 credit
Seminar and Instruction Learning Courses	-	9 credits	9 credits
Dissertation courses	48 credits	36 credits	48 credits
Total not less than	48 credits	48 credits	72 credits

3. Courses

3.1 Remedial Courses 6 Credits (non-credit)

LC 4003	Advanced Reading and Writing in English for Graduate Studies	3 Credits
LC 4013	Remedial Advanced Reading and Writing in English for Graduate Studies	3 Credits
LC 4004	Advanced Integrated English Language Skills Development	3 Credits
LC 4014	Remedial Advanced Integrated English Language Skills Development	3 Credits

Remarks: Remedial Courses, LC 4003 and LC 4004, are required by the Committee, for students who do not achieve a TOEFL score of at least 550 or an IELTS score of at least 6. 5. Conditions for taking English language courses are according to the announcement of the institution.

3.2 Foundation Courses

CI 5001	Strategic Communication Competence Development for Persuasive Presentation	2 Credits
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Remark: Optional to take for Student Plan 1 (1.1) and 2 (2.1) This course could be enrolled and studied in the courses provided by Master of Sciences in CSIS.

3.3 Core Courses

CI 6001	Research Methods in Computer Science and Information Systems	3 Credits
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Remarks: Optional to take for Student Plan 1 (1.1) and 2 (2.1). Students can take this course based on Ph.D. Dissertation's advisor recommendation.

3.4 Major Courses for Qualify Examination (Optional to take)

Computer Science Track

CI 7108	Advanced Artificial Intelligences	3 Credits
CI 7110	Design and Analysis of Algorithms	3 Credits
CI 7411	Advanced Computer Architectures	3 Credits

Information Systems Track

CI 7403	Business Process Redesign	3 Credits
CI 7505	Information Systems Auditing	3 Credits
CI 7506	Digital Transformation	3 Credits

Remarks: 1. Optional to take for Student Plan 1 (1.1) and 2 (2.1), 9 credit for student who studies in plan 2 (2.2), these major courses for qualifying exam could be enrolled and studied in the courses provided by Master of Sciences in CSIS

2. All students must choose the track preferred and passing three corresponding courses of selected track

3.5 Elective Courses (At least 3 credits)

CI 7000-7002	Selected Topics in Computer Science and Information Systems	1 Credits
CI 7003-7005	Selected Topics in Computer Science and Information Systems	2 Credits
CI 7006-7008	Selected Topics in Computer Science and Information Systems	3 Credits

Remarks: Optional to take for Student Plan 1 (1.1), 3 credits for Plan 2 (2.1), 1 credit for Plan 2 (2.2) students. Only Students Plan 2 (2.2) can be enrolled for elective courses offered in master program of computer science and information systems and other related master's degree program based on PhD dissertation's advisor recommendation.

3.6 Seminar and Instruction Learning Courses (9 credits)

CI 8001	Seminar in Artificial Intelligence and Business Intelligence	3 Credits
CI 8002	Seminar in Graphics and Interactive Techniques	3 Credits
CI 8003	Seminar in Technology and Application	3 Credits
CI 8004	Seminar in Application Design and Software Engineering	3 Credits
CI 8005	Seminar in Digital Transformation and Governance	3 Credits
CI 8006	Seminar in Computer Networks and Cyber	3 Credits

Remarks: There courses in Seminar and Instruction Learning are required to take as Preliminary Exam. The students can freely select 3 courses. For passing Preliminary Exam, the students must receive grade not less than “B”, for Plan 2 (2.1) and Plan 2 (2.2). Students enrolled in Plan 1 (1.1) is optional to take these courses according to thesis advisor and committees, however students must show the CLO results and submit the evaluation evidence which are equivalent to the expected level as enroll these courses.

3.7 Dissertation (48 credits)

CI9900	Dissertation	36 /48 Credits
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4. Study Plan

Students who have earned a master’s degree are allowed to study in Plan 1 (1.1) and 2 (2.1). Students who graduated with a bachelor’s degree are allowed to study in Plan 2 (2.2) only.

Plan 1 (1.1) Dissertation only

1st Semester of the 1st Year

LC 4003	Advanced Reading and Writing in English for Graduate Studies	3 credits *
CI 800X	Seminar and Instruction Learning Courses	9 credits **

2nd Semester of the 1st Year

LC 4004	Advanced Integrated English Language Skills Development	3 credits *
CI XXXX	Elective Course	3 credits **
CI 9900	Dissertation	6 credits

Remarks: for the remaining 42 credits, students could enroll in CI 9900 dissertation classes for the remainder semesters of the program. The study plan can be adjusted based on suitability.

* Basic training courses which may be required by the Committee for students who do not achieve a TOEFL score of at least 550 or an IELTS score of at least 6.5. Conditions for taking English language courses are according to the announcement of the institution.

** Optional to take for Student Plan 1 (1.1) or based on PhD dissertation's advisor recommended.

Plan 2 (2.1) Dissertation and coursework

1st Semester of the 1st Year

LC 4003	Advanced Reading and Writing in English for Graduate Studies	3 credits *
CI XXXX	Elective Course	3 credits
CI 800X	Seminar and Instruction Learning Courses	6 credits

2nd Semester of the 1st Year

LC 4004	Advanced Integrated English Language Skills Development	3 credits *
CI 800X	Seminar and Instruction Learning Courses	3 credits
CI 9900	Dissertation	6 credits

Remarks: for the remaining 30 credits, students could enroll in CI 9900 dissertation classes for the remainder semesters of the program. The study plan can be adjusted based on suitability.

* Basic training courses which may be required by the Committee for students who do not achieve a TOEFL score of at least 550 or an IELTS score of at least 6.5. Conditions for taking English language courses are according to the announcement of the institution.

Plan 2 (2.2) Dissertation and coursework (student graduated with a bachelor's degree)

1st Semester of the 1st Year

LC 4003	Advanced Reading and Writing in English for Graduate Studies	3 credits *
CI 5001	Fundamental courses	2 credits
CI 7XXX	Major Course	6 credits
CI 7XXX	Elective Course	1 credit

2nd Semester of the 1st Year

LC 4004	Advanced Integrated English Language Skills Development	3 credits *
CI 6XXX	Core Course	3 credits

CI 7XXX	Major Course	3 credits
CI 800X	Seminar and Instruction Learning Courses	3 credits
1st Semester of the 2nd Year		
CI 800X	Seminar and Instruction Learning Courses	6 credits
CI 9900	Dissertation	6 credits

Remarks: for the remaining 42 credits, students could enroll in CI 9900 dissertation classes for the remainder semesters of the program. The study plan can be adjusted based on suitability.

* Basic training courses which may be required by the Committee for students who do not achieve a TOEFL score of at least 550 or an IELTS score of at least 6.5. Conditions for taking English language courses are according to the announcement of the institution.

5. Course Description

LC 4003 Advanced Reading and Writing in English for Graduate Studies 3(3-0-6)

This course is aimed to review of essential reading and writing strategies required to read and write academic English. Course contents include work on sentence structures, vocabulary and recognition of major thought relationships in paragraphs, as well as practice in reading and writing academic English.

LC 4004 Advanced Integrated English Language Skills Development 3(3-0-6)

This course is aimed to provide contents and teaching activities that focus on the integrated skills of listening, speaking, reading and writing with a particular emphasis on academic writing. Students will also work in small groups, practicing paper presentation techniques, precise writing, and research writing.

LC 4013 Remedial Advanced Reading and Writing in English for Graduate Studies 3(3-0-6)

This course is intended to provide additional practices in the reading and writing skills and strategies for students who failed to acquire essential skills in LC 4003 Advanced Reading and Writing in English for Graduate Studies. Students receive individualized attention to enhance their reading and writing skills for academic purposes.

LC 4014 Remedial Advanced Integrated English Language Skills 3(3-0-6)
Development

This course is intended to provide additional practices in the four skills—listening, speaking, reading, and writing strategies covered in LC 4004 Advanced Integrated English Language Skills Development. Students receive individualized attention to enhance their communication skills in English.

CI 5001 Strategic Communication Competence Development for 2(2-0-4)
Persuasive Presentation

This course focuses on providing students with the social psychological perspectives to communication utilizing the holistic approaches to students' communication competence development in terms of attitudinal, bodies of knowledge, and skills/competence for strategic presentational approaches to communication. The gist of the course emphasizes building the accurate understanding of the applicable theories and concepts involving strategic presentation, persuasion, and conflict management based upon ethical communication. The students will also be exposed to the hands-on approaches to the practicum workshop involving the strategically persuasive presentation sessions within this 2-credit hour- course.

CLO:

- 1. Students are developed theoretical and practical bodies of knowledge, and enhanced persuasion skill for strategic presentation.**
- 2. Students able show the ability when practicing in presentational delivery and handling feedback constructively.**
- 3. Students can inculcate the instill ethics in communication for strategic presentation and conflict resolution constructively.**

CI 6001 Research Methods in Computer Science and Information 3(3-0-6)
Systems

Introduction to research areas in computer science and information systems, qualitative and quantitative methods of research, research project writing and presentation, statistical analysis and experimental design techniques, literature searches and reviews, and research ethics.

CLO:

1. Students able to use various research methods when doing their dissertation.
2. Students can read, write and review research papers.

CI 7000 - 7002 Selected Topics in Computer Science and Information Systems 1(1-0-2)

This course is designed to improve students' research background related to the dissertation topic selected.

CLO: Students should catch up knowledge of a topic related to the dissertation topic selected.

CI 7003 - 7005 Selected Topics in Computer Science and Information Systems 2(2-0-4)

This course is designed to improve students' research background related to the dissertation topic selected.

CLO: Students should catch up knowledge of two or more topic related to the dissertation topic selected.

CI 7006 - 7008 Selected Topics in Computer Science and Information Systems 3(3-0-6)

This course is designed to improve students' research background related to the dissertation topic selected.

CLO: Students should catch up knowledge of an integrated topic related to the dissertation topic selected.

CI 7108 Advanced Artificial Intelligences 3(3-0-6)

Planning, Knowledge Representation, Uncertain knowledge, Probabilistic Reasoning, Machine Learning and Neural Networks, Reinforcement Learning, Natural Language Processing, Computer Vision.

Prerequisite: CI 7101 Artificial Intelligence (Master Program in CSIS) or consent of the instructor

CLO: Students can apply, analyze, and evaluate the advanced topics about artificial intelligence widely researching currently which would be used to further researches in Computer Science.

Remark: This course will be opened for registering in MS. CSIS program.

CI 7110 Design and Analysis of Algorithms 3(3-0-6)

Complexity of algorithms, analysis of algorithm complexity, divide-and-conquer algorithms, amortized analysis, Advanced priority queues, disjoint sets, graph algorithms, greedy algorithms, dynamic programming, Geometric Algorithms, NP-Completeness problems, approximation algorithms.

Prerequisite: CI 4003 (Master Program in CSIS) or consent of the instructor

CLO:

1. Students can analyze and evaluate the techniques which used to analyzed the algorithms which will be used to analyze the current complex programs and applications.
2. Students can show the ability about how to use data structures and write the codes for more efficient ways.

Remark: This course will be opened for registering in MS. CSIS program.

CI 7403 Business Process Redesign 3(3-0-6)

An integrated approach for the analysis and refinement of business processes utilizing BPM (business process management) principles. Business Performance Measurement. Bridging business process design with the deployment of well-matched technologies, both on the strategic-side as well as the operations-side of the enterprise. Feasibility analysis of system alternatives; assessment of technology-based risk; and the quality assurance and implementation of these technologies.

Prerequisite: CI 6001 (Master Program in CSIS), CI 7401 (Master Program in CSIS) or consent of the instructor

CLO:

1. Students can analyze the relationships among business processes and business performance indicators, so they can identify the responsible persons and functions.
2. Student can evaluate the performance of the business processes, digital technologies currently used, laws and regulations, related contracts and requirements, and qualification of employees and stakeholders related. Students should be able to analyze and identify the problems which affect the organization's performance.
3. Students can identify the way to solve the business problems, either by redesign the business process, design and develop the information systems supporting the business processes, add some business intelligences, and/or apply the digital technology. Students also need to manage all pieces of business processes and functions, programs and applications, and rules and regulations as business knowledges which can be reused.

Remark: This course will be opened for registering in MS. CSIS program.

CI 7411 Advanced Computer Architectures 3(3-0-6)

Computer models and architectures, parallel computing, pipeline computer architectures, superscalar processor architecture, SIMD computer architectures, MIMD computer architectures, interconnection networks.

CLO: Students can apply, analyze, and evaluate the advanced computer models and computer architectures which would be used to further researches in Computer Science.

Remark: This course will be opened for registering in MS. CSIS program.

CI 7505 Information Systems Auditing 3(3-0-6)

IS auditing process and notions of controls. The key assurance tasks most relevant to the contemporary role of IS auditors. Several IS audit frameworks and methodologies and the role of IS auditors in the statutory audit. The course concludes with an examination of the ethics and professionalism in IS audit. The course focuses primarily on the Internal Audit perspective and examines in detail each of the areas that IS auditors operating in the internal audit context will face.

Prerequisite: CI 6001 (Master Program in CSIS), CI 7401 (Master Program in CSIS) or consent of the instructor

CLO:

1. Students analyze and integrate the context of business processes, laws and regulations, standards, requirements and ethics. Students should be able to apply all of them to prepare the information systems auditing plan.
2. Students can identify the audit evidences, how to access, the confidentiality management, analysis and evaluate the evidences with laws, standards, and requirements related. Students can write a reasonable audit report which supports the organization's strategy and trend of digital technology in the future.

Remark: This course will be opened for registering in MS. CSIS program.

CI 7506 Digital Transformation

3(3-0-6)

Integrating technological and managerial aspects of information technology, defining the information and information technology to facilitate new coordination and communication within and across entities, enable new organizational forms and business processes, change the information environment underlying the business. The role of information technology (IT) in corporate strategy with specific attention paid to the Internet, disruptive technology, agile concept. Action plan to bring information technology to use, business continuity plan, organizational culture, human resource development plan, laws and regulations.

CLO:

1. Students can analyze and evaluate the roles of digital technology in the organization.
2. Students can analyze and evaluate the importance of coordination and teams-working among employees in the organization.
3. Students can identify and apply the digital technology to use in the organization for enhancing the performance of the organization, along with increasing the capability of the employees to work with the applications selected for continuous improvement.

Remark: This course will be opened for registering in MS. CSIS program.

CI 8001 Seminar in Artificial Intelligence and Business Intelligence 3(1-1-3)

Seminar in research topics in artificial intelligence and business intelligence. Students must study past research on the topics and present the results of the study with the guidance of the instructors.

CLO: Students can catch up with the current status of research in artificial intelligence and business intelligence areas.

CI 8002 Seminar in Graphics and Interactive Techniques 3(1-1-3)

Seminar in research topics in computer interaction. Students must study past research on the topics and present the results of the study with the guidance of the instructors.

CLO: Students can catch up with the current status of research in Graphics and Interactive Techniques areas.

CI 8003 Seminar in Technology and Application 3(1-1-3)

Theoretical foundation, current state-of-the-art developments, and potential future directions of artificial intelligence and machine learning, cybersecurity and data privacy, biotechnology and bioinformatics, Internet of Things and smart systems, quantum computing and quantum information science, blockchain technology and cryptocurrencies.

CLO: Students can catch a comprehensive understanding of cutting-edge technologies and their real-world implications.

CI 8004 Seminar in Application Design and Software Engineering 3(1-1-3)

Seminar in research topics in application design and software engineering. Students must study past research on the topics and present the results of the study with the guidance of the instructors.

CLO: Students can catch up with the current status of research in application design and software engineer areas.

CI 8005 Seminar in Digital Transformation and Governance 3(1-1-3)

Digital technologies used to disrupting business models and transforming business landscapes, how to effectively digitalize, leverage the new technologies, and implement well for business efficiency and growth, features of evolving digital platforms and multi-sided market, network

multiplier effects and consequences, how to build a sustainable platform strategy, how to manage and solve users' needs and pain points, ideate and iterate for improvements in outcomes and value creation, data analytic and data audit.

CLO: Students can catch up a sufficient board view of digitalization possibilities and a sufficient depth of understanding to manage digital technology and information for efficient and legal usage.

CI 8006 Seminar in Computer Networks and Cyber 3(1-1-3)

Seminar in research topics in networks and cyber. Students must study past research on the topics and present the results of the study with the guidance of the instructors.

CLO: Students can catch up with the current status of research in computer networks and cyber areas.

CI 9900 Dissertation 36 /48 Credits

Each student conducts research on a particular topic under an advisor's consultation and attends courses as suggested by the advisor. Students must submit a dissertation proposal, research progress reports, and take a final examination, also publish at least 2 papers in selected international journal as required by MHESI's announcement.

CLO:

1. The student can identify the required knowledge or the problem required to solve related to Computer Science and Information Systems.
2. The student can develop the research methodology that helps developing proposed knowledge or solving proposed problem.
3. The student can identify knowledge found from developing new technical knowledge, extract knowledge from industrial practitioners or solving the identified problem.
4. The students are able to deliver the knowledge developed from solving the industrial problems or newly developed knowledge to other academic persons or practitioners with good quality of communication.
5. The student must follow the laws and regulations related to the knowledge identified, as well as ethics, standards, and professional qualifications when publishing the proposed knowledge.