Course Specification

Section 1 General Information

1. Course Code and Title

In Thai   ICGH 130 ห้องปฏิบัติการตรรกศาสตร์

In English   ICGH 130 The Logic Lab

2. Number of Credits

2 (2-0-8)

(Theory 2 hrs. Practice 0 hrs. Self-Study 8 hrs./week)

3. Curriculum and Course Type

3.1 Program   bachelor's degree program ☐ Thai Program X International Program

3.2 Course Type   General Education Course

                        ☐ Core Course   ☐ Language

                              X MU Literacy

                        ☐ Elective Course

3.3 Specify Course's Literacy

      ☐ MU Literacy

      ☐ Health Literacy

      X Science and Environmental Literacy

      ☐ Intercultural and Global Awareness Literacy

      ☐ Civic Literacy

      ☐ Finance and Management Literacy

4. Course Coordinator and Instructor

4.1 Course Responsible Instructor   Gerald Moshammer

4.2 Instructors   Barbara Maria Ekamp

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5. Trimester/Class Level

    5.1 Trimester   All / Class Level All MUIC students

    5.2 Number of Students Allowed   Approximately 40 Students

6. Prerequisites

    None

7. Co-requisites

    None

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Section 2 Course Goals and Course Description

1. Course Goals

Making students intellectually equipped to understand, translate, and critically assess the structure and function of logical arguments; fostering analytical capability in implementing and evaluating formal reasoning methods such as categorical logic and truth-functional systems; shaping precision in distinguishing valid from invalid inferences, and cultivating sensitivity to the relationship between rational structure and practical application in decision-making and problem-solving contexts.

2. Course Description

แนะนำตรรกศาสตร์เชิงรูปแบบและตรรกศาสตร์เชิงสัญลักษณ์อย่างครบถ้วน โดยเน้นเป็นหลักที่ตรรกศาสตร์แบบพจน์เชิงพวกและฟังก์ชันความจริง ซึ่งเป็นหลักการพื้นฐานของการให้เหตุผลเชิงตรรกะ โดยมีเป้าหมายเพื่อให้นักศึกษาได้รับความเข้าใจอย่างมั่นคงในการวิเคราะห์อาร์กิวเมนต์พื้นฐาน การแปลประพจน์ และการประเมินค่าความจริงของประพจน์

Introducing comprehensively formal and symbolic logic, by focusing primarily on categorical logic and truth functions; fundamental principles of logical reasoning with the goal of gaining a solid understanding of analyzing basic arguments, translating propositions, and evaluating truth-values.

Section 3 Course Objectives, Course-level Learning Outcomes and Course Implementation

1. Course Objectives

Students will have been made intellectually aware of and argumentatively capable of critically translating, classifying, and evaluating propositions within the frameworks of categorical and symbolic logic, with their capacity for identifying valid inference patterns, constructing formal representations, and navigating the mechanics of truth-functional operations having been developed in tandem with a sensitivity to the formal rigor and interpretive subtlety involved in reasoning under both abstract and applied conditions

2. Course-level Learning Outcomes: CLOs

On completion of the course, the students will be able to ....

CLO1: Analyze and classify categorical propositions using Venn diagrams and syllogistic reasoning to assess the validity of arguments.

CLO2: Translate natural language statements into symbolic logic using connectives and construct truth tables to determine the truth-values of compound propositions.

CLO3: Distinguish between deductive and inductive reasoning, identify logical fallacies, and assess argument validity using formal techniques in both categorical and propositional logic.

CLO4: Accurately convert between ordinary language and formal logical notation, and apply logical rules to test the validity of arguments.

General Education Course

Program Level   x   Bachelor ☐ Graduate Diploma ☐ Master ☐ Higher Graduate Diploma ☐ Doctor

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3. How to organize learning experiences to develop the knowledge or skills stated in number 2 and how to measure the learning outcomes

CLOs	Teaching and learning experience management				Learning outcomes measurements			
	Lecture	In-class problem solving (individual)	In-class discussion	Video analysis	Midterm Exam	Final Exam	Quizzes	Discussion contributions
CLO1	x	x			x		x	x
CLO2	x	x	x	x	x		x	x
CLO3	x		x	x		x	x	x
CLO4	x	x	x			x	x	x

Section 4 Lesson Plan and Evaluation

1. Lesson Plan

Teaching Period	Topics/Details	Number of hours		Methods: Teaching Media	Lecturer
		Theory*	Practice**		
Class 1	Introduction to Logic, Arguments, and Formal Language	2hrs	-	Lecture, Discussion, Icebreaker Activity, Q&A.	Barbara Ekamp
Class 2	Categorical Propositions (A, E, I, O) and Venn Diagrams	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 3	Syllogisms and Testing Validity with Venn Diagrams	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 4	Translating Statements into Symbolic Logic with Connectives	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application)	

Class 5	Constructing and Analyzing Truth Tables	2hrs	-	Lecture, Recap, Discussion (Concept Exploration & Application).	
Class 6	Validity and Rules of Inference in Propositional Logic	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 7	Introduction to Predicate Logic and Quantifiers	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 8	Translating and Transforming Predicate Logic Statements	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 9	Deductive vs Inductive Reasoning and Argument Strength	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	

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Class 10	Logical Fallacies and Cognitive Biases	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 11	Informal Arguments and Editorial Analysis	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
Class 12	Review, Integration, and Final Argument Evaluation	2hrs	-	Lecture, Recap, Group Work (Problem Solving), Discussion (Concept Application).	
	Total hours (minutes) of the entire trimester	24 hrs	-		

2. Plan for Assessment of Expected Course-Level Learning Outcomes (CLOs)

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment

Weekly reviews will allow the instructor to judge how students are responding to the material delivered in class and how their critical thinking skills are developing. In-class discussions will allow the instructor   to check students' understanding of the different theories and their applications to specific case studies.

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B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	Quizzes	Midterm Exam	Final Exam	Participation & Home-work	
CLO1: Analyze and classify categorical propositions using Venn diagrams and syllogistic reasoning to assess the validity of arguments.	7.5	15	5	2.5	**30**
CLO2: Translate natural language statements into symbolic logic using connectives and construct truth tables to determine the truth-values of compound propositions.	7.5	15	5	2.5	**30**
CLO3: Distinguish between deductive and inductive reasoning, identify logical fallacies, and assess argument validity using formal techniques in both categorical and propositional logic.	7.5	-	10	2.5	**20**
CLO4: Accurately convert between ordinary language and formal logical notation, and apply logical rules to test the	7.5	-	10	2.5	**20**

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validity of arguments.					
Total	30	30	30	10	100

(2) Grading Rules

Grade	Achievement	Final Score (%range)	GPA
A	Excellent	90-100	4.0
B+	Very good	85-89	3.5
B	Good	80-84	3.0
C+	Fairly good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very poor	60-64	1.0
F	Fail	Less than 60	0.0

(3) Measurement and Evaluation

To pass the course a grade of D (60%) or above is required.

2.2   Re-examination (if the course allows any.)

Not applicable

3. Students' Appeal

1. An appeal shall be made for oneself only and must be made within 30 days from the date of being acknowledged or regarded to be aware of the order. The appeal must be in writing showing the facts and reasons for the appeal and explain how the order is invalid, inappropriate or unfair. In addition, the appellant is required to put his/her signature, affiliated working unit and address.

2. The appellant has the right to request examining and making a copy of personal statement records, other evidence, or relevant documents. To allow this request, however, is under the discretion of the person who orders the punishment, or it can be allowed under any condition.

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3. For the purpose of deterring the appeal period, the date on which the student signs the penalty order shall be regarded as the date of acknowledgement of the order.

4. With regard to an appeal, the appellant shall write a letter to Chairperson of the Appeal Committee by submitting or sending it directly to the Chairperson or through the Head of the Working Unit that the appellant belongs to.

5. The appeal to be accepted for consideration must be valid in the essence under Clause 1 The Appeal Committee shall consider promptly, not more than 60 days from the date the appeal letter is received. In case that whether or not any appeal is accepted for consideration, the Appeal Committee shall consider and promptly notify the appellant of the resolution.

6. The student appellant may withdraw the appeal before the Appeal Committee completes a decision. With regard to this, the appellant shall write a letter and submit to Chairperson of the Appeal Committee. When the case has been withdrawn, the consideration of appeal shall be terminated.

7. When the Appeal Committee has considered an appeal and passed a resolution, the Chairperson shall notify the University Council, the appellant for acknowledgement and notify the person who issues the penalty order to promptly proceed with the decision of the Appeal committee." "In case the student is not of the legal age, the parents or the guardian of the student shall also be notified.

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Section 5 Teaching Resources

1. Required Texts

Hurley, P. J. (2012). *A Concise Introduction to Logic* (11th ed.). Belmont, CA: Wadsworth Publishing Company.

Copi, I. M., & Cohen, C. (2005). *Introduction to Logic* (12th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

2. Suggested Materials

W.V.Q. Quine, Elementary Logic, Harvard UP: 1980 (revised Edition).

W.V.Q. Quine, Methods of Logic, Harvard UP: 1982 (Fourth Edition).

3. Other Resources (if any)

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Section 6 Evaluation and Improvement of Course Implementation

1. Analysis and Evaluation of Course Implementation

A. Data for Analysis

- students' course evaluation scores

- student teacher evaluation scores

- Student grade distribution

B. Course Effectiveness Evaluation

Assessment of:

- pass/fail rates

- student satisfaction rates and feedback

- CLO achievement

2. Revision Process and Improvement Plan for Course Effectiveness

- participation in teacher-development seminars, trainings, workshops or other intra-departmental/OAA activities

- use of precisely designed rubrics for all tests and assignments

- regular internal review of curriculum structure and aligned course content through SWOT analysis as part of the ICIC Curriculum Committee and the College's Curriculum Review Committee revision process

3. The self-assessment report of the course

- regular internal review of curriculum structure and aligned course content through the ICIC Curriculum Committee and the College's Curriculum Review Committee presented in regular self-assessment reports (under AUNQA guidelines).

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Appendix

1. Relations between the course and the General Education

<u>Table 1</u> Relations between CLOs and MU-GE Module LOs (numbers in the table = Sub LOs)

Course Code: ICGH 130	MU-GE LOs								
	MLO1	MLO2	MLO3	MLO4	MLO5	MLO6	MLO7	MLO8	MLO9
CLO1: Analyze and classify categorical propositions using Venn diagrams and syllogistic reasoning to assess the validity of arguments.	1.4	2.2	3.1						
CLO2: Translate natural language statements into symbolic logic using connectives and construct truth tables to determine the truth-values of compound propositions.	1.1	2.1	3.1						
CLO3: Distinguish between deductive and inductive reasoning, identify logical fallacies, and assess argument validity using formal techniques in both categorical and propositional logic.	1.4	2.2					7.1		
CLO4: Accurately convert	1.3		3.1					8.1	

between ordinary language and formal logical notation, and apply logical rules to test the validity of arguments.										

Table 2 LOs that the course is responsible for

MLOs	SubMLOs
1. create & construct an argument effectively as well as identify, critique and evaluate the logic & validity of arguments	1.1 identify concepts related to the context of learned issues/topics
	1.3 collect, analyze, synthesize data, & evaluate information and ideas from multiple sources relevant to issues/problems
	1.4 synthesize information to arrive at logical reasoning
2. select & use techniques and methods to solve open-ended, ill-defined and multistep problems	2.1 apply simple mathematical methods to the solution of 'real-world' problems
	2.2 make judgement & decision through correct analysis, inferences, and evaluations on quantitative basis and multiple perspectives
3. acquire specific strategies & skills within a particular discipline and adapt them to a new problem or situation	3.1 connect, synthesize and/or transform ideas or solutions within a particular framework
7. apply ethical frameworks or principles and consider their implications in his/her decision-making and interacting with others	7.1 identify ethical issues and recognize different viewpoint and ideologies
8. use a variety of means/ technologies to communicate effectively and purposefully-e.g., share information/	8.1 communicate/present ideas effectively both oral & written forms, proper to a range of audience groups, such as verbal discussion with peers, project report.

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knowledge, express ideas, demonstrate or create individual & group product, etc.	

2. Rubric scoring*

1. Midterm Exam (30%, Final Exam (30%) and Quizzes (30%)

Evaluates theoretical understanding and application of key logical theories and concepts.

Criteria	Excellent (A)	Good (B)	Satisfactory (C)	Needs Improvement (D/F)
Understanding of Concepts	Accurate, deep grasp of theories and terminology.	Mostly accurate with minor misunderstandings.	Basic understanding; some key gaps.	Lacks clarity; major misunderstandings.
Application of Concepts	Insightful use of theory to analyze or solve problems.	Generally solid application.	Somewhat relevant; limited insight.	Misapplied or irrelevant use of theory.
Argumentation & Structure	Well-structured, logical, with supported points.	Mostly logical and coherent.	Some structure; points underdeveloped.	Poor structure; unclear reasoning.
Language & Clarity	Clear, precise language with few or no errors.	Generally clear; some minor issues.	Errors present but not disruptive.	Frequent errors interfere with understanding.

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2. Homework & Participation (10%)

Criteria	Excellent (A)	Good (B)	Satisfactory (C)	Needs Improvement (D/F)
Preparation	Always prepared, engages with readings/activities.	Usually prepared, references materials.	Sometimes prepared; minimal contribution.	Rarely prepared or unaware of content.
Contributions	Adds insightful, relevant points; constructive tone.	Participates regularly; mostly relevant.	Infrequent or surface-level comments.	Rarely participates or distracts others.
Listening & Engagement	Encourages peers, listens actively, respectful tone.	Listens well, respectful.	Sometimes disengaged or inattentive.	Disrespectful, distracted, or interrupting others.

3. Relations between the course and Sustainable Development Goals (SDGs)

☐ SDG1   No poverty

☐ SDG2   Zero Hunger

☐ SDG3   Good Health and Well – being

☐ SDG4   Quality Education

☐ SDG5   Gender Equality

☐ SDG6   Clean Water and Sanitation

☐ SDG7   Affordable and Clean Energy

☐ SDG8   Decent Work and Economic Growth

☐ SDG9   Industry, Innovation and Infrastructure

☐ SDG10 Reduced Inequalities

☐ SGD11 Sustainable Cities and Communities

☐ SDG12 Responsible Consumption and Production

☐ SDG13 Climate Action

☐ SDG14 Life Below Water

☐ SDG15 Life on Land

☐ SDG16 Peace, Justice and Strong Institutions

X   SDG17 Partnerships for the goals

MU-GE Module LOs: At the end of studying MU-GE Module, successful students will be able to

Competences	LOs:	Sub LOs:
1. **Critical thinking & Analysis**: Use various sources and methods to collect and manage data & information and make a logical judgement and decision to arrive at solution or problem solving relevant to real-world issues/ problems	1. create & construct an argument effectively as well as identify, critique and evaluate the logic & validity of arguments	1.1 identify concepts related to the context of learned issues/topics 1.2 demonstrate ICT literacy: use appropriate technology to find, evaluate, and ethically use information 1.3 collect, analyze, synthesize data, & evaluate information and ideas from multiple sources relevant to issues/problems 1.4 synthesize information to arrive at logical reasoning
	2. select & use techniques and methods to solve open-ended, ill-defined and multistep problems	2.1 apply simple mathematical methods to the solution of 'real-world' problems 2.2 make judgement & decision through correct analysis, inferences, and evaluations on quantitative basis and multiple perspectives 2.3 apply concept of process management to solve problems
2. **Creativity & Innovation**: shows capability to initiate alternative/ new ways of thinking, doing things or solving problems to improve his/her or team solutions/ results by applying the evidence-based process management concepts	3. acquire specific strategies & skills within a particular discipline and adapt them to a new problem or situation	3.1 connect, synthesize and/or transform ideas or solutions within a particular framework 3.2 integrate alternative, divergent, or contradictory perspectives or ideas in the solution of a problem or question
	4. create a novel or unique ideas, question, format, or product within a particular framework	4.1 create an original explanation or solution to the issues/problems 4.2 articulate the rationale for & consequences of her/his solution- identify opportunities & risk 4.3 implement innovation through process management approach
	5. explore and situate oneself in a new physical environment and intellectual perspectives	5.1 demonstrate cultural competencies and adaptabilities in different working environments 5.2 resort to multi-dimensional settings & tools to acquire knowledge and skills relevant to the problems or situation at hand

Competences	LOs:	Sub LOs:
3. Global perspectives & Ethics: Express one's own ideas, interact with others, guide or lead team, as proper, as an ethically- engaged and responsible member of the society	6. act autonomously within context of relationships to others, law, rules, codes, and values	6.1 demonstrate an understanding of the principles upon which sustainable ecosystems and societies are built 6.2 identify the national & global challenges associated with current economic, political, and social systems 6.3 exhibit characteristics of responsible citizenship 6.4 work effectively in diverse team (and multi-cultural settings)
	7. apply ethical frameworks or principles and consider their implications in his/her decision-making and interacting with others	7.1 identify ethical issues and recognize different viewpoint and ideologies 7.2 guide & lead others 7.3 apply principle of ethical leadership, collaborative engagement, and respect diversity
4. Communication: communicate effectively and confidently using oral, visual, and written language	8. use a variety of means/ technologies to communicate effectively and purposefully- e.g., share information/ knowledge, express ideas, demonstrate or create individual & group product, etc.	8.1 communicate/present ideas effectively both oral & written forms, proper to a range of audience groups, such as verbal discussion with peers, project report. 8.2 prepare a purposeful oral presentation designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors. 8.3 prepare written documents to express ideas/solutions using different writing technologies, and mixing texts, data, and images.
5. Collaboration and Working with team: collaborate and work effectively with team to arrive at team goals	9. collaborate and work effectively as part of a student group/team member to arrive at the team shared-goals in time	9.1 collaborate effectively with others as a responsible team member to achieve team goals in time 9.2 interact with others respectfully, whether as a team member or leader, to create a productive teamwork