

GENERAL EDUCATION, KMITL

COURSE SYLLABUS

Course Code	96642170	Course Title	Introduction to Logic				
Total Credits	3	Semester / Year of Study	1/2025	Section	1	Date- Time	Tue 13:00-16:00
Course Description (English)	Study of basic concepts, principles, techniques, and tools of logic, as well as their applications; analyzing arguments; deductive and inductive reasoning; fallacies; basic symbolic logics; methods of proof; applications of logic for problem solving and in everyday life.						
Course Coordinator	Dr. Natthapong Jungteerapanich						
Course Instructors	Dr. Natthapong Jungteerapanich						
Teaching Assistant (if any)	-						
Counselling Schedule	Tue 16:00-17:00			Teaching Language	☐ Thai ☒ English ☐ Others, please specify.....		
Website or Online Teaching Method (if any)	GoEDU						
Course Learning Outcomes							
By the end of this course, the student will be able to CLO-1. Recognize arguments in the real world and describe their structures CLO-2. Describe and identify logical fallacies CLO-3. Represent knowledge using Propositional Logic and First Order Logic CLO-4. Explain the methods of proof in mathematics CLO-5. Apply tools and techniques of logic to solve logical problems and problems in everyday life							

General Education Learning Outcome: GE-LO	
GE-LO	Value
☒ GE-LO-1 Analytical and Critical Thinking	6
☒ GE-LO-2 Complex Problem Solving	6
☐ GE-LO-3 Creativity	
☐ GE-LO-4 Interpersonal Skills	
☐ GE-LO-5 Integrity and Perseverance	
☐ GE-LO-6 Active Learning and Learning Strategies	
☐ GE-LO-7 Resilience, Stress Tolerance and Flexibility	
☒ GE-LO-8 Leadership and Social Influence	3
☐ GE-LO-9 Communication	
☐ GE-LO-10 Entrepreneurship and Startup	
☐ GE-LO-11 Digital Quotient Literacy and Digital Media Production	
Total Value	<u>15</u>

Teaching Plan and Evaluation Plan

Week	Topic/Sub-topic	Activities	Notes
1	Course overview What is logic?	Lecture, In-class activities	CLO-1
2	Recognizing arguments	Lecture, In-class activities	CLO-1
3	Informal fallacies	Lecture, In-class activities	CLO-2
4	Propositional logic: syntax and semantics Truth tables Translating English statements into formulas in propositional logic	Lecture, In-class activities	CLO-3, CLO-5
5	Natural deduction in propositional logic	Lecture, In-class activities	CLO-5
6	Boolean satisfiability problem: algorithms and applications	Lecture, In-class activities	CLO-5
7	Basic set theory: sets, relations, and functions	Lecture, In-class activities	CLO-3
8	Basic set theory: infinite sets Inductive definitions	Lecture, In-class activities	CLO-3
9	First-order predicate logic: syntax and semantics Translating English statements into formulas in first-order logic	Lecture, In-class activities	CLO-3
10	Natural deduction in first-order predicate logic	Lecture, In-class activities	CLO-5
11	Limitations of first-order predicate logic	Lecture, In-class activities	CLO-3
12	Methods of proof in mathematics	Lecture, In-class activities	CLO-4
13	Methods of proof in mathematics (cont.)	Lecture, In-class activities	CLO-4
14	Recursion and induction	Lecture, In-class activities	CLO-4
15	Review	Lecture, In-class activities	

Evaluation Plan

Assessment Activities	Value	Score	Week of Evaluation	Notes
Homework assignments	2	8	Weeks 2-7, 10-15	
Coding project	3	12	Week 18	Individual project: Write a computer program that effectively applies logical tools/techniques to solve a problem. Each student is to submit his/her program and a report.
Midterm exam	5	20	Week 9	
Final exam	5	20	Week 18	
Total	15	60		

Evaluation criteria

☐ Group-based								
☒ Standard-based								
Grade	A	B+	B	C+	C	D+	D	F
Score (60 points)	57-60	49-56.9	41-48.9	34-40.9	27-33.9	21-26.9	15-20.9	0-14.9
☐ Satisfactory/Unsatisfactory (S/U)								
Grade	S				U			
Score (60 points)	30-60				0-29.9			

Scoring criteria according to Assessment Plan

Assessment Activities	Learning Outcomes	Value	Level			
			4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
Homework assignments	GE-LO-8	2	- Submitted at least 90% of all assignments on time.	- Submitted at least 75% of all assignments on time.	- Submitted at least 50% of all assignments on time.	- Submitted at least 20% of all assignments on time.
Coding project	GE-LO-2	2	Satisfy all criteria below: - Effectively applying logical tools and techniques. - The program can run correctly. - The report clearly explains how the logical tools and techniques are applied.	Satisfy all criteria below: - Effectively applying logical tools and techniques. - The program can run correctly. - The report does not clearly explain how the logical tools and techniques are applied.	Satisfy all criteria below: - Applying logical tools and techniques but ineffectively. - The program is partially correct and complete.	The project submitted did not meet the criteria in any higher level.
	GE-LO-8	1	- Submitted the project on time.	- Submitted the project within 24 hours after the deadline.	- Submitted the project within 3 days after the deadline.	- Submitted the project later than 3 days after the deadline.
Midterm exam	GE-LO-1	3	Satisfy all criteria below: - Describe the structures of complex arguments correctly. - Describe and identify complex or subtle logical fallacies correctly. - Demonstrate a thorough understanding of the syntax and semantics of Propositional Logic.	Satisfy at least three of the criteria below: - Describe the structures of non-complex arguments correctly. - Describe and identify clear logical fallacies correctly. - Demonstrate a basic understanding of the syntax and semantics of Propositional Logic.	Satisfy at least two of the criteria below: - Describe the structures of non-complex arguments correctly. - Describe and identify clear logical fallacies correctly. - Demonstrate a basic understanding of the syntax and semantics of Propositional Logic.	Satisfy at least one of the criteria below: - Describe the structures of non-complex arguments correctly. - Describe and identify clear logical fallacies correctly. - Demonstrate a basic understanding of the syntax and semantics of Propositional Logic.

Assessment Activities	Learning Outcomes	Value	Level			
			4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
			- Represent complex English statements using Propositional Logic correctly.	- Represent non-complex English statements using Propositional Logic correctly.	- Represent non-complex English statements using Propositional Logic correctly.	- Represent non-complex English statements using Propositional Logic correctly.
	GE-LO-2	2	- Apply tools and techniques in propositional logic to solve complex problems effectively.	- Apply tools and techniques in propositional logic to solve non-complex problems effectively.	- Able to utilize tools and techniques in propositional logic and able to analyze the given problems, but unable to apply the tools/techniques to solve the problems effectively.	- Demonstrate the knowledge of the tools and techniques in propositional logic but unable to utilize them correctly.
Final exam	GE-LO-1	3	Satisfy all criteria below: - Demonstrate a thorough understanding of sets, functions, and relations. - Demonstrate a thorough understanding of the syntax and semantics of First-Order Logic. - Represent complex English statements using First-Order Logic correctly. - Demonstrate a thorough understanding of recursive/inductive definitions.	Satisfy at least three of the criteria below: - Demonstrate a basic understanding of sets, functions, and relations. - Demonstrate a basic understanding of the syntax and semantics of First-Order Logic. - Represent non-complex English statements using First-Order Logic correctly. - Demonstrate a basic understanding of	Satisfy at least two of the criteria below: - Demonstrate a basic understanding of sets, functions, and relations. - Demonstrate a basic understanding of the syntax and semantics of First-Order Logic. - Represent non-complex English statements using First-Order Logic correctly. - Demonstrate a basic understanding of	Satisfy at least one of the criteria below: - Demonstrate a basic understanding of sets, functions, and relations. - Demonstrate a basic understanding of the syntax and semantics of First-Order Logic. - Represent non-complex English statements using First-Order Logic correctly. - Demonstrate a basic understanding of

Assessment Activities	Learning Outcomes	Value	Level			
			4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)
				recursive/inductive definitions.	recursive/inductive definitions.	recursive/inductive definitions.
	GE-LO-2	2	Satisfy all criteria below: - Apply tools and techniques in first-order logic to solve complex problems effectively. - Effectively apply methods of proof to construct proofs for non-simple theorems.	Satisfy all criteria below: - Apply tools and techniques in first-order logic to solve non-complex problems effectively. - Effectively apply methods of proof to construct proofs for simple theorems.	Satisfy all criteria below: - Able to utilize tools and techniques in first-order logic and able to analyze the given problems, but unable to apply the tools/techniques to solve the problems effectively. - Demonstrate the knowledge of the methods of proof but unable to apply them correctly.	Satisfy at least one of the criteria below: - Demonstrate the knowledge of the tools and techniques in first-order logic but unable to utilize them correctly. - Demonstrate the knowledge of the methods of proof but unable to apply them correctly.