Telkom University	FAKULTAS INFORMATIKA
	Program Studi S1 Informatika PJJ

BERKAS PENYUSUNAN

RENCANA PEMBELAJARAN

SEMESTER (RPS)

Telkom University	FAKULTAS INFORMATIKA
	Program Studi S1 Informatika PJJ

Matakuliah	:	LOGIKA MATEMATIKA
Kode Mata Kuliah	:	CPI1B3
SKS	:	3 SKS
Semester	:	1
Tahun Akademik	:	2023/2024

RENCANA PEMBELAJARAN SEMESTER
PROGRAM STUDI S1 Informatika PJJ
FAKULTAS INFORMATIKA – TELKOM UNIVERSITY

MATAKULIAH	KODE	RUMPUN MK	BOBOT		SEMESTER	VERSION
LOGIKA MATEMATIKA	CPI1B3	-	T= -	P= -	Gasal	2023-09-08 05:47:33
OTORITAS	PENGEMBANG RPS		KETUA KELOMPOK KEAHLIAN			Ka PRODI
	Muhammad Arzaki S.Si., M.Kom.					

Deskripsi Mata Kuliah	EN: Mathematical Logic course provides a rigorous exposure concerning mathematical logic for computer science. There are five main topics in this course, i.e.: propositional logic, first-order predicate logic, mathematical proof methods, mathematical induction, and elementary set theory. These topics are grouped into four course learning outcomes (CLO), namely: CLO 1 (propositional logic), CLO 2 (first-order predicate logic), CLO 3 (mathematical proof methods and mathematical induction), and CLO 4 (elementary set theory). ID: Perkuliahan Logika Matematika memberikan paparan rinci mengenai logika matematika untuk ilmu komputer. Ada lima topik utama pada kuliah ini, yaitu: logika proposisi, logika predikat orde pertama, metode pembuktian matematis, induksi matematika, dan teori himpunan elementer. Topik-topik ini dikelompokkan ke dalam empat capaian pembelajaran (Course Learning Outcome, CLO), yaitu: CLO 1 (logika proposisi), CLO 2 (logika predikat orde pertama), CLO 3 (metode pembuktian matematis dan induksi matematika), dan CLO 4 (teori himpunan elementer).
Tipe Merdeka Belajar	Belum Ada
Deskripsi Merdeka Belajar	

Capaian Pembelajaran Mata Kuliah

Program Learning Outcomes (PLO) / CPL PRODI	
PLO 3	[PLO3] Mampu menerapkan sains dan matematik untuk menyelesaikan masalah keteknikan dengan prinsipprinsip computing.

Course Learning Outcomese (CLO)		PLO yang di dukung
CLO 1	CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.	PLO 3
CLO 2	CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	PLO 3
CLO 3	CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	PLO 3

	CLO 4	CLO 4: Students can write set notations correctly and perform elementary set operations.	PLO 3

Tabel Penilaian	PLO	CLO	Assessment Tools	Question
	[PLO-3] [PLO3] Mampu menerapkan sains dan matematik untuk menyelesaikan masalah keteknikan dengan prinsipprinsip computing.	[CLO-4]CLO 4: Students can write set notations correctly and perform elementary set operations.	CLO 4 Evaluation(25%)	Exam CLO 4(70%)
				Online Quiz CLO 4(30%)
		[CLO-1]CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.	CLO 1 Evaluation(25%)	Exam CLO 1(70%)
				Online Quiz CLO 1(30%)
		[CLO-2]CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	CLO 2 Evaluation(25%)	Exam CLO 2(70%)
				Online Quiz CLO 2(30%)
		[CLO-3]CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	CLO 3 Evaluation(25%)	Exam CLO 1(70%)
				Online Quiz CLO 1(30%)

Pustaka	
	Utama
	K. H. Rosen, Discrete Mathematics and Its Applications, 8th Edition. McGraw-Hill, 2019
	Pendukung
	H. J. Gensler, Introduction to Logic, Routledge, New York, 2010.
	V. Klenk, Understanding Symbolic Logic, Pearson Prentice Hall, 2008.
	R. Munir, Matematika Diskrit (5th edition [revised]), Informatika, 2012.
	M. Huth and M. Ryan, Logic in Computer Science: Modelling and Reasoning about Systems (Chapter 1 and 2), 2nd Edition, 2004.
	M. Bramer, Logic Programming with Prolog (Chapter 1 and 2), 2nd Edition, Springer, 2013.
	S. S. Epp. Discrete Mathematics with Applications, 5th Edition. Brooks/ Cole Cengage Learning, 2018.
	M. Ben-Ari, Mathematical Logic for Computer Science (Chapter 1,2,3,5,8), 2nd Edition, 2000.

Media Pembelajaran	
	Software
	SWI-Prolog version 7 or later
	LMS
	Python 3
	Google Meet
	Hardware
	-

Sertfikat	No	Nama Sertifikat	Deskripsi	Link
Team Teaching	Muhammad Arzaki S.Si., M.Kom.			
Matakuliah Syarat				

Minggu dan Pertemuan	CLO Number	Hasil Pembelajaran yang Diharapkan (SUB - CLO)	Penilaian		Materi Pembelajaran [Referensi]	Metode Pembelajaran [Model]	Pengalaman Pembelajaran Mahasiswa	
			Indikator/ Bukti Ketercapaian CLO	Bentuk			Tatap Muka [estimasi waktu]	Daring [estimasi waktu]
CLO 1 CLO CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.								
1-1	CLO 1	• [CLO 1] CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.	• ??? Ketepatan dari tabel kebenaran yang dibuat.	CLO 1 Evaluation	• Introduction to propositions. Propositional operators and compound proposition (negation, conjunction, disjunction, xor, implication, and bi-implication).	• Full Online	• Introduction to learning resource and regulation.[1X120 Menit]	• Online Quiz for Topic 1.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 1 CLO CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.								
2-1	CLO 1	• [CLO 1] CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.	• ??? Ketepatan dari tabel kebenaran yang dibuat. ??? Ketepatan dari klasifikasi semantic yang dilakukan. ??? Ketepatan dari kesimpulan terkait konsekuensi logis dan kesetaraan logika.	CLO 1 Evaluation	• Interpretation and semantics of propositional formulas. Satisfiability, validity, contradiction, and contingency. Logical consequence and logical equivalence.	• Full Online		• Online Quiz for Topic 2.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 1 CLO CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.								
3-1	CLO 1	• [CLO 1] CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic.	• ??? Ketepatan dari hasil translasi yang dilakukan. ??? Ketepatan dari analisis konsisten spesifikasi sistem. ??? Ketepatan dari inferensi yang dilakukan.	CLO 1 Evaluation	• Translating natural language sentences into their corresponding propositional formulas.Analyzing the consistency of system???s specification in propositional logic formulas. Conducting inference in propositional logic.	• Full Online	• Assignment discussion.[3X50 Menit]	• Assignment[1X120 Menit] • Online Quiz for Topic 3.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 2 CLO CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.								
4-1	CLO 2	• [CLO 2] CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	• ??? Ketepatan dari penentuan nilai kebenaran. ??? Ketepatan dalam penulisan dan pemakaian kuantor. ??? Ketepatan dalam menentukan cakupan dari sebuah kuantor. ??? Ketepatan dalam sintaks penulisan formula logika predikat.	CLO 2 Evaluation	• Introduction and motivation to predicate. Quantification and quantifier. Bounded and free variables, quantifier scope. Precedence of quantifier and other logical operators.	• Full Online		• Online Quiz for Topic 4.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 2 CLO CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.								

Minggu dan Pertemuan	CLO Number	Hasil Pembelajaran yang Diharapkan (SUB - CLO)	Penilaian		Materi Pembelajaran [Referensi]	Metode Pembelajaran [Model]	Pengalaman Pembelajaran Mahasiswa	
			Indikator/ Bukti Ketercapaian CLO	Bentuk			Tatap Muka [estimasi waktu]	Daring [estimasi waktu]
5-1	CLO 2	• [CLO 2] CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	• ??? Ketepatan dari penentuan nilai kebenaran.	CLO 2 Evaluation	• Truth of formulas with one quantifier. Truth of formulas with two or more quantifiers.	• Full Online		• Online Quiz for Topic 5.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 2 CLO CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.								
6-1	CLO 2	• [CLO 2] CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	• ??? Ketepatan dari hasil translasi. ??? Ketepatan dari negasi yang diperoleh. ??? Ketepatan dari inferensi yang dilakukan.	CLO 2 Evaluation	• Translation from natural language to first-order predicate logic. Negation of quantified statements. Inference in first-order predicate logic.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 6.[1X45 Menit]
CLO 2 CLO CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.								
7-1	CLO 2	• [CLO 2] CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	• ??? Kebenaran dari program logika pada Prolog. ??? Ketepatan dari keluaran query sederhana pada Prolog.	CLO 2 Evaluation	• Introduction to Prolog. Knowledge base in Prolog. Variable and query in Prolog.	• Full Online	• Assignment discussion.[3X50 Menit]	• Assignment[1X120 Menit] • Programming exploration and exercise.[1X50 Menit] • Online Quiz for Topic 7.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit]
CLO 1 CLO CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic. CLO 2 CLO CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.								
8-1	CLO 1,CLO 2	• [CLO 1] CLO 1: Students can explain the syntax, semantics, and inference rule of propositional logic. • [CLO 2] CLO 2: Students can explain the syntax, semantics, and inference rule of first-order predicate logic.	• Kecermatan dalam menentukan sintaks, semantik, dan langkah inferensi untuk logika proposisi. • Kecermatan dalam menentukan sintaks, semantik, dan langkah inferensi untuk logika predikat orde pertama.	CLO 2 Evaluation,CLO 1 Evaluation	• All materials for CLO 2. • All materials for CLO 1.	• Full Online		• Midterm exam.[3X50 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.								

Minggu dan Pertemuan	CLO Number	Hasil Pembelajaran yang Diharapkan (SUB - CLO)	Penilaian		Materi Pembelajaran [Referensi]	Metode Pembelajaran [Model]	Pengalaman Pembelajaran Mahasiswa	
			Indikator/ Bukti Ketercapaian CLO	Bentuk			Tatap Muka [estimasi waktu]	Daring [estimasi waktu]
9-1	CLO 3	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	• ??? Ketepatan dari manipulasi matematis yang dilakukan.	CLO 3 Evaluation	• High-school mathematics review: integer arithmetic, fractions, exponents, and algebraic ideintities.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 8.[1X45 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.								
10-1	CLO 3	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	• ??? Kebenaran dan kejelasan dari bukti.	CLO 3 Evaluation	• Mathematical terminology. Mathematical definition. Structure of mathematical proof. Direct proof methodology Indirect proof using contraposition.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 9.[1X45 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.								
11-1	CLO 3	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	• ??? Kebenaran dan kejelasan dari bukti.	CLO 3 Evaluation	• Indirect proof using contradiction. Proving equivalent statements. Refuting mathematical statements using counterexamples.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 10.[1X45 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.								
12-1	CLO 3	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	• ??? Kebenaran dan kejelasan dari bukti.	CLO 3 Evaluation	• Motivation and definition of ordinary mathematical induction. The principle of ordinary mathematical induction.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 11.[1X45 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.								
13-1	CLO 3	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction.	• ??? Kebenaran dari kalkulasi barisan yang didefinisikan secara rekursif. ??? Kebenaran dan kejelasan dari bukti.	CLO 3 Evaluation	• Limitation of ordinary mathematical induction. Motivation and definition of strong mathematical induction. The principle of strong mathematical induction.	• Full Online	• Assignment discussion.[3X50 Menit]	• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 12.[1X45 Menit] • Assignment.[1X120 Menit]
CLO 4 CLO CLO 4: Students can write set notations correctly and perform elementary set operations.								

Minggu dan Pertemuan	CLO Number	Hasil Pembelajaran yang Diharapkan (SUB - CLO)	Penilaian		Materi Pembelajaran [Referensi]	Metode Pembelajaran [Model]	Pengalaman Pembelajaran Mahasiswa	
			Indikator/ Bukti Ketercapaian CLO	Bentuk			Tatap Muka [estimasi waktu]	Daring [estimasi waktu]
14-1	CLO 4	• [CLO 4] CLO 4: Students can write set notations correctly and perform elementary set operations.	• ??? Kebenaran dari penulisan notasi himpunan. ??? Kebenaran dari penentuan relasi antar dua himpunan. ??? Kebenaran dari penentuan kardinalitas himpunan berhingga.	CLO 4 Evaluation	• Basic set notations dan set definitions. Subset, superset, and set equality. Prominent set of numbers. Cardinality of finite sets.	• Full Online		• Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Online Quiz for Topic 13.[1X45 Menit]
CLO 4 CLO CLO 4: Students can write set notations correctly and perform elementary set operations.								
15-1	CLO 4	• [CLO 4] CLO 4: Students can write set notations correctly and perform elementary set operations.	• ??? Kebenaran dari hasil operasi himpunan. ??? Kebenaran dari hasil kali Kartesius dua himpunan berhingga. ??? Kebenaran model himpunan dari cerita yang ditinjau. ??? Kebenaran dari penerapan prinsip inklusi-eksklusi.	CLO 4 Evaluation	• Elementary set operations. Cartesian product. Inclusion-exclusion principle.	• Full Online	• Assignment discussion.[3X50 Menit]	• Online Quiz for Topic 14.[1X45 Menit] • Video lectures and lectures notes. Online forum discussion. Guided exercise.[3X50 Menit] • Assignment.[1X120 Menit]
CLO 3 CLO CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction. CLO 4 CLO CLO 4: Students can write set notations correctly and perform elementary set operations.								
16-1	CLO 3,CLO 4	• [CLO 3] CLO 3: Students can prove mathematical statements using elementary proof methods and mathematical induction. • [CLO 4] CLO 4: Students can write set notations correctly and perform elementary set operations.	• Kecermatan dalam menentukan kebenaran dan membuktikan pernyataan matematis. • Kecematan dalam menuliskan dan melakukan operasi matematika terkait himpunan.	CLO 3 Evaluation,CLO 4 Evaluation	• All materials for CLO 3. • All materials for CLO 4.	• Full Online		• Final exam.[3X50 Menit]