TEACHING INSTRUCTIONAL DESIGN (BRP)

COURSE
ARTIFICIAL INTELLIGENCE

by

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UNIVERSITAS INDONESIA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
PHYSICS UNDERGRADUATE STUDY PROGRAM

TEACHING INSTRUCTIONAL DESIGN

Course Name	Artificial Intelligence	**Credit(s)**	**Prerequisite course(s)**	**Requisite for course(s)**	**Integration Between Other Courses**
Course Code	SCPH604707	2	Calculus 1 & 2 Elementary Linear Algebra Computational Physics	-	
Relation to Curriculum	Elective Course				
Semester	7				
Lecturer(s)	Adhi Harmoko Saputro				
Course Description	This course explains the basic concepts of artificial intelligence and applies them to analyzing and designing an intelligent instrumentation system.				

Program Learning Outcome (PLO)	
PLO-1	Describe the latest instruments that support its work
PLO-2	Using IT in lectures

Course Learning Outcome (CLO)	
CLO-1	Describe the basic concepts of artificial intelligence
CLO-2	Apply artificial intelligence to analyze and design a simple intelligent instrumentation system
Sub-CLO	
Sub- CLO 1	Describe the basic concepts of artificial intelligence
Sub- CLO 2	Explain the concept of unsupervised learning
Sub- CLO 3	Explain the concept of supervised learning
Sub- CLO 4	Describe the basic concepts of current artificial intelligence
Sub- CLO 5	Implement artificial intelligence
Sub- CLO 6	Designing a simple intelligent instrumentation system
Study Materials	Introduction to artificial intelligence; problem representation & heuristic search techniques: hill climbing, simulated annealing, depth, breadth, best first search, genetic algorithm and A-star algorithm; knowledge representation; reasoning: rule-based, fuzzy logic, diagnosis reasoning; machine learning & learning algorithms: supervised learning: regression, support vector machines, artificial neural networks, unsupervised learning: partitional-based clustering, hierarchical clustering, self-organizing maps; reinforcement learning; statistical learning; deep learning.
Reading List	**Compulsory:** 1. S.J.Russel and P.Norvig, *Artificial Intelligence: A Modern Approach*, 3rd edition, Pearson, 2016.

	2. V.Chandra and A.Hareendran, *Artificial Intelligence and Machine Learning*, PHI Learning, 2014. **Additional:** 1. G.James, D.Witten, T.Hastie and R.Tibshirani, *An Introduction to Statistical Learning*, Springer, 2017. 2. E.Alpaydin, *Introduction to Machine Learning*, 4th edition, MIT Press, 2020

RENCANA PEMBELAJARAN

Week	Sub-CLO	Study Materials [with reference]	Teaching Method [with est. time]	Learning Experiences (*O-E-F)	Sub-CLO Achievement Indicator		Sub-CLO Weight on Course (%)
					General	Specific	
1	Describe the basic concepts of artificial intelligence	Introduction to artificial intelligence S.J. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V. Handra and A. Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			8%
2	Describe the basic concepts of artificial intelligence	problem representation & heuristic search techniques: hill climbing, simulated annealing, depth, breadth	discussion 100 minutes	Presentation of material - question and answer discussion			8%

		S.J. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V. Handra and A. Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.					
3	Describe the basic concepts of artificial intelligence	best first search S.J. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V. Handra and A. Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014	discussion 100 minutes	Presentation of material - question and answer discussion			7%
4	Describe the basic concepts of artificial intelligence	genetic algorithm and A-star algorithm S.J. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V. Handra and A. Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
5	Describe the basic concepts	knowledge representation; reasoning	discussion 100 minutes	Presentation of material -			7%

	of artificial intelligence	S.J. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V. Handra and A. Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.		question and answer discussion			
6	Explain the concept of supervised learning	rule-based, fuzzy logic, diagnosis reasoning S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
7	Explain the concept of supervised learning	machine learning & learning algorithms S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
8	Mid term exam						

9	Explain the concept of supervised learning	Regression S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
10	Explain the concept of supervised learning	support vector machine S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
11	Explain the concept of supervised learning	artificial neural networks S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
12	Explain the concept of unsupervised learning	partitional-based clustering, hierarchical clustering	discussion 100 minutes	Presentation of material - question and			7%

		S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.		answer discussion			
13	Explain the concept of unsupervised learning	self-organizing maps; reinforcement learning S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
14	Describe the basic concepts of current artificial intelligence	statistical learning & deep learning S.J.Russel and P.Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson, 2016. V.Chandra and A.Hareendran, Artificial Intelligence and Machine Learning, PHI Learning, 2014.	discussion 100 minutes	Presentation of material - question and answer discussion			7%
15	Implement artificial intelligence Designing a simple	Presentation	discussion 100 minutes	Presentation of material - question and answer discussion			7%

	intelligent instrumentation system						
16	Final exam						

Assignment Design

Week	Assignment Name	Sub-CLOs	Assignment	Scope	Working Procedure	Deadline	Outcome
10	Designing a Final Project Proposal	Implement artificial intelligence	Make a Proposal		Group assignment	2 Weeks	Proposal
15	Present the Final Project	Designing a simple intelligent instrumentation system	Make the Final Project and Present it		Group assignment	3 Weeks	Reports, Thumbnail Systems and Presentation Materials

Assessment Criteria (Learning Outcome Evaluation) Pada bagian ini dituliskan

Evaluation Type	Sub-CLO	Assessment Type	Frequency	Evaluation Weight (%)
Designing a Final Project Proposal	Implement artificial intelligence	Proposal in comprehensible writing	1	5%
Present the Final Project	Designing a simple intelligent instrumentation system	Systems that work well and presentations that are easy to understand	1	25%
Mid Term Exam				35%
Final Exam				35%
Total				**100%**

Rubric(s):

This rubric is used as a guideline for assessing or giving levels of student performance results. a rubric usually consists of assessment criteria that include the dimensions / aspects that are assessed based on indicators of learning achievement. This assessment rubric is useful for clarifying the basics and aspects of the assessment so that students and lecturers can be guided by the same thing regarding the expected performance demands. Lecturers can choose the type of rubric according to the assessment given.

Number Score	Letter Score	Weight
85-100	A	4,00
80—<85	A-	3,70
75—<80	B+	3,30
70—<75	B	3,00
65—<70	B-	2,70
60—<65	C+	2,30
55—<60	C	2,00
40—<55	D	1,00
<40	E	0,00

Example of Assignment Report Assessment Rubric:

Criteria	Score	Indicator
Introduction	4	Contains: (1) background for the preparation of the report, (2) problem identification / gap analysis, (3) questions (4) objectives, and (5) citing relevant and current references
	3	Loads the goal and 3 of the other 4 items
	2	Loading objective and 2 of the other 4 items
	1	Does not contain the purpose of preparing the report, there are one or more than 4 other items
	0	Does not contain objectives and 4 other items
Content of Substance	4	Structured & cohesive, conducts a comprehensive literature review and performs a complete critical analysis
	3	Structured, conduct a comprehensive literature review and complete critical analysis
	2	Less structured, conducting literature reviews but less comprehensive and carrying out simple critical analysis
	1	Unstructured & cohesive, review of literature is not comprehensive and does not contain critical analysis
Conclusion	4	Related to the implementation of tasks and there are suggestions for feasible improvements to the next assignment
	3	It is related to the implementation of tasks and there are suggestions for improvement of the next assignment but it is not feasible
	2	Regarding the implementation of the task but there is no suggestion
	1	Not related to the execution of duties and no suggestions
	4	The report is neat and attractive, complete with cover and photo / picture
	3	The report is neat and attractive, with a cover or photo / image
	2	The report includes a cover or photo / image but is not neat or attractive
	1	The report is not neat and unattractive, does not have a cover and photo / image
	4	Easy to understand, correct word choice, and spelling all right
	3	Easy to understand, correct word choice, some misspellings
	2	Less understandable, inaccurate word choice, and some misspellings
	1	It is not easy to understand, the choice of words is not quite right, and there are lots of misspellings