Ahsanullah University of Science and Technology
Bangladesh

COURSE OUTLINE

1. Title: Artificial Intelligence Lab

2. Code: CSE4108

3. Credit hours: 3

4. Level: Level 4, Term 1

5. Faculty: Engineering

6. Department: Computer Science and Engineering (CSE)

7. Programme: Bachelor of Science in Computer Science and Engineering (B.Sc. in CSE)

8. Synopsis from the Approved Curriculum:

Laboratory works based on CSE4107 that includes : "Survey of basic AI concepts and controversies; Knowledge Representation and Reasoning: Propositional and first order predicate logic, inconsistencies and uncertainties, structured representation; Knowledge Organization and Manipulation: search and control strategies, game playing, planning, decision making; Perception and Communication: natural language processing, visual image understanding; Knowledge acquisition (Machine learning); Introduction to knowledge-based systems (Expert systems)."

9. Type of course (core/elective): Core

10. Prerequisite(s) (if any): Nil

11. Name of the instructor(s) with contact details and office hours:

Dr. S. M. A. Al-Mamun
Room: 7A01/B
Phone: Extension 502
E-mail: almamun@aust.edu, al_mamun81@yahoo.com
Office hour: SUN 09:40 – 10:30 AM, MON 10:30 – 11:20, TUE 10:30 – 11:20 PM

Mr. Siam Ansary
Part-time Faculty

12. Semester Offered: **Spring, 2019-2020**

13. Mapping of Course Outcomes with Bloom's Taxonomy and Programme Outcomes

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	**Comprehend the fundamental concepts of Artificial Intelligence (AI) techniques and approaches**	**1**			**2**
2	**Apply proven AI techniques such as Informed Search, Adversarial Search, Planning, Probabilistic Reasoning and Decision making, Machine Learning, etc.**	**2**			**3**
3	**Analyze use of AI techniques in solving complex real world problems**	**3**			**4**

14. Percentages of Assessment Methods

Method	Percentage
Attendance and Class Performance	**20**
Assignment (Offline/Online)	**40**
Lab Quiz (Mid-Term/Final)	**40**

15. Week wise distribution of contents and assessment methods

Week	Topics	Assessment Method(s)
1	**Introduction to Declarative and Procedural ways of Representing Knowledge:** Knowledge as collection of Facts and Rules; Facts and Rules in Prolog and Python; Queries and answers through elementary Prolog and Python.	**Class Assignment / Online**
2	**Elements of Informed Search:** Heuristic functions for efficiency in large search space; Recursion in Prolog and Python; Lists in Prolog and Python; Computation of different heuristic functions in Prolog and Python.	**Class Assignment / Online**
3	**Best First Search:** Implementation of Greedy Best First and A* Search in Prolog and Python; Dynamic data and multiple module programming in Prolog	**Class Assignment / Online** **Term Project 1**

		and Python.	Lab Quiz 1 (mid-term)
4	**Local Search and Optimization:** Implementation of Hill Climbing, Simulated Annealing and Genetic algorithms; Elements of OOP with Python, and rule-based decision systems with Prolog.	**Class Assignment / Online** **Term Project 2**
5	**Classification and Learning:** Data classification and machine learning using Linear Regression, Naïve Bayes, Decision Tree and Neural Network algorithms.	**Class Assignment / Online** **Term Project 3**
6	**Adversarial Search, Planning and Decision Networks:** MiniMax algorithm and search tree pruning, Forward state-space search for generating plans, Extended Bayesian networks for optimal decision making.	**Class Assignment / Online** **Lab Quiz 2 (term final)**
7	**Review and Final Assessment**	**Last submission of Assignments/ Term Projects**

16. References

16.1. Required (if any)

1. ***Artificial Intelligence: A Modern Approach***
   Author(s): S. J. Russell & P. Norvig
   Publisher: Pearson
   Edition: 3rd, 2011

2. **The Art of Prolog,**
   Author(s): Leon Sterling & Ehud Shapiro
   Publisher: MIT Press
   Edition: 2nd

3. **Learn Python the Hard Way**
   Author(s): Zed Shaw
   Publisher: Addison-Wesley
   Edition: 3rd, 2016

16.2. Recommended (if any)

Prepared by:	Checked by:	Approved by:
Signature: _____ Name: **Dr. S. M. A. Al-Mamun** Department: **CSE** Date:	Signature: _____ Name:**Dr. Mohammad Shafiul Alam** **OBE Program Coordinator, CSE** Date:	Signature: _____ Name: **Professor Dr. Kazi A Kalpoma** HOD, **CSE** Date:

Annex-1: PEO of CSE

PEO1 - Professionalism
Graduates will demonstrate sound professionalism in computer science and engineering or related fields.

PEO2 – Continuous Personal Development
Graduates will engage in life-long learning in multi-disciplinary fields for industrial and academic careers.

PEO3 – Sustainable Development
Graduates will promote sustainable development at local and international levels.

Annex-2: Mapping of PEO-PO

	PEO1	PEO2	PEO3
PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	√		
PO2 - Problem analysis: Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences.	√		
PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.	√		
PO4 – Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	√		

PO5 - Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	√		
PO6 - The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	√		√
PO7 - Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.	√		√
PO8 – Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of engineering practice.	√		
PO9 - Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.	√	√	
PO10 – Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.	√		
PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.	√		
PO12 - Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.		√	

Annex-3: Blooms Taxonomy – Revised Version*

Level	Cognitive Domain (C)	Affective Domain (A)	Psychomotor Domain (P)
1	Remember	Receive	Imitate
2	Comprehend	Respond	Execute
3	Apply	Value	Perform
4	Analyze	Conceptualize Values	Adaption
5	Evaluate	Intermalize Values	Neturalize
6	Create		

* References: Dyjur, P. (2018). Writing Course Outcomes