



1	Program	B.Sc. Engg. in CSE																																																															
2	Course Code	CSE 352																																																															
3	Course Title	Artificial Intelligence and Expert Systems Lab																																																															
4	Course Type	Core Course																																																															
5	Academic Session	Spring 2021																																																															
6	Credit Hour	1.50																																																															
7	Intake	39																																																															
8	Section	1																																																															
9	Campus	Permanent Campus																																																															
10	Course Teacher	Name: Dr. M. Firoz Mridha					Designation: Associate Professor																																																										
		Specialization: Artificial Intelligence, Machine Learning, Deep Learning, Natural Language Processing, Deep Learning																																																															
		Room No. 312/B1					Email: firoz@bubt.edu.bd					Cell No. 01674791594																																																					
11	Class Schedule	<table><tr><td colspan="2">Class Day</td><td colspan="5">Class Hours</td><td colspan="6">Class Room</td></tr><tr><td colspan="2">Sunday</td><td colspan="5">08:30 AM – 11.30 AM</td><td colspan="6">418 (B-2)</td></tr></table>													Class Day		Class Hours					Class Room						Sunday		08:30 AM – 11.30 AM					418 (B-2)																														
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12	Course Objectives	This Sessional (lab) course is based on the theory course CSE-351Artificial Intelligence and Expert System. The aim of this lab is to allow the students to learn and practice an Artificial Intelligence friendly language Python. Students will be able to learn the syntax and semantics of python language and the incorporation of AI algorithms to solve various real-life problems. Students will be able to practice AI collaboration to solve advanced level problems.																																																															
13	Text Book	1. Artificial Intelligence: A Modern Approach - Stuart Russel & Peter Noervig																																																															
14	Reference Book	1. Artificial Intelligence: A Guide to Intelligent Systems - Michael Negnevitsky 2. Introduction to Artificial Intelligence and Expert Systems - Dan W. Patterson																																																															
15	Course Outcomes (COs)	Upon completing this course students will be able to: CO1: Demonstrate the basic as well as the advanced knowledge of Python programming in order to use modern AI tools and techniques. CO2: Analyze and apply different AI algorithms to solve various real life problems. CO3: Design and develop a simple AI project using modern AI techniques.																																																															
	Mapping of COs toPOs	<table><tr><td>CO</td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td></tr><tr><td>CO1</td><td></td><td></td><td></td><td></td><td>√</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td>√</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>√</td><td></td><td></td><td></td></tr></table>													CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	CO1					√								CO2			√										CO3									√		
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12																																																					
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	CO No.	PO No.	Bloom's Domain / Level	Delivery Methods / Activities	Assessment Tools												
	CO1	PO5	Cognitive / Understanding	Lectures, Lab Task, Assignment.	Lab Performance												
	CO2	PO3	Cognitive / Applying	Lectures, Lab Task, Assignment.	Lab Performance												
	CO3	PO9	Psychomotor / Guided Response	Lectures ,Lab Task, Assignment.	Project												
16	Teaching Strategy	Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some class notes will be uploaded on the web. White board will be used for most of the time. Multimedia projector and a PC will be used for the convenience of the students to understand codes practically. Students must participate in classroom discussions for case studies, problems solving and project developments.															
17	Assessment and Marks Distribution:	<table><tr><td>Class Attendance</td><td>:</td><td>10%</td></tr><tr><td>Assignment</td><td>:</td><td>20%</td></tr><tr><td>Lab Performance</td><td>:</td><td>30%</td></tr><tr><td>Final Project</td><td>:</td><td>40%</td></tr></table>				Class Attendance	:	10%	Assignment	:	20%	Lab Performance	:	30%	Final Project	:	40%
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18	Weekly Schedule																
	Week	Lab	Topics														
	Week1	Lab1	Introductory Python Programming														
	Week2	Lab2	Syntax and Semantics of python, Loop, Number, String, List basics, Function.														
	Week3	Lab3	Python Packages and Modules. Lab Performance Evaluation.		C												
	Week4	Lab4	OOP using Python. Exception Handling.														
	Week5	Lab5	Basic programming practice using Python. Lab Performance Evaluation.		C												
	Week6	Lab6	Uninformed search implementation. Lab Performance Evaluation.		C												
	Week7		Mid-Term Week														
	Week8	Lab7	Uninformed search implementation continued.														
	Week9	Lab8	Informed search implementation. Lab Performance Evaluation.		C												
	Week10	Lab9	Informed search implementation (cont.). Discussion on project proposal.														
	Week11	Lab10	Genetic Algorithm implementation using Python. Lab Performance Evaluation.		C												
	Week12	Lab11	Perceptron Learning Algorithm using Python. Lab Performance Evaluation.		C												
	Week13	Lab12	Project/ Team Work: Students will work in a team to implement the project.														
	Week14	Lab13	Final Project Evaluation		C												
	Week 15		Final Term Week														

19	Overall CO Assessment Criteria	Assessment methods of COs are given below:									
		Assessment Area			Course Outcomes CO				Assessment Area Mark		
			CO1	CO2	CO3						
		Attendance									
		Lab Assignment									
		Lab Performance			10	20		30			
		Project Evaluation					40	40			
Total Mark			10	20	40	70					
20	Lab Performance Assessment Details	Lab #	Criteria	COs	Excellent(5)	Good(4)	Satisfactory(3)	Unsatisfactory (0-2)	Marks (30)		
					Student demonstrates an accurate understanding of the lab objectives and concepts. The student can correctly answer questions and if appropriate, can explain concepts to the course teacher.	Student arrives on time to lab, but may be unprepared. Answers to questions are basic and superficial suggesting that concepts are not fully grasped.	Student tardiness or unpreparedness makes it impossible to fully anticipate. If able to participate, student has difficulty explaining key lab concepts.	Student was absent from lab or did not participate. There was no attempt to make prior arrangements to make up the lab.			
		L3	Python Packages and Modules	CO1	”	”	”	”	5		
		L5	Basic programming practice using Python	CO1	”	”	”	”	5		
		L6	Uninformed search implementation	CO2	”	”	”	”	5		
		L8	Informed search implementation	CO2	”	”	”	”	5		
		L10	Genetic Algorithm implementation using Python	CO2	”	”	”	”	5		
		L11	Perceptron Learning Algorithm using Python	CO2	”	”	”	”	5		

21	Lab Project Assessment Details	Criteria	Excellent(5)	Good(4)	Satisfactory(3)	Unsatisfactory(0-2)	Max																				
		Project completeness	Student demonstrates project completely	Student can demonstrate some main parts of the project	Student can explain some of the term of the projects but cannot describe in detail	Students were either absent or know nothing about the project	10																				
		Usage of Library	Student uses python library where appropriate	Student uses python library but somewhere unknowingly	Student has very few understanding of python library	Student has no concept of python library or they do not use any	10																				
		Project Report	Student has the complete understanding of the project and the report. The report is appropriate formatted and no portion of the content is copied.	Student has a basic knowledge of content, but may lack some understanding of some concepts. The report is appropriate formatted with some irregularities although no portion of the content is copied.	Student has lack of knowledge about project and the report. The report is not formatted at all and the content of the report is inappropriate.	Student either did not submit the report or the report is copied and totally inappropriate	10																				
		Presentation and viva	Student delivers presentation appropriately and explains the questions properly.	Student seems unprepared in the presentation but can share his knowledge appropriately	Student expresses his lack of knowledge in the presentation	Student is absent or the cannot deliver presentation	10																				
22	Grading Policy	The following chart will be followed for grading. This has been customized from the guideline provided by the School of Engineering and Computer Science. <table><tr><td>A+</td><td>A</td><td>A-</td><td>B+</td><td>B</td><td>B-</td><td>C+</td><td>C</td><td>D</td><td>F</td></tr><tr><td>≥ 80</td><td>75-<80</td><td>70-<75</td><td>65-<70</td><td>60-<65</td><td>55-<60</td><td>50-<55</td><td>45-<50</td><td>40-<45</td><td><40</td></tr></table>						A+	A	A-	B+	B	B-	C+	C	D	F	≥ 80	75-<80	70-<75	65-<70	60-<65	55-<60	50-<55	45-<50	40-<45	<40
A+	A	A-	B+	B	B-	C+	C	D	F																		
≥ 80	75-<80	70-<75	65-<70	60-<65	55-<60	50-<55	45-<50	40-<45	<40																		
23	Additional Course Policies	Assignments	There will be at least two assignments. Average marks of the assignments will be counted. No late homework will be accepted. <i>Any kind of copy/manipulation in assignment will carry zero mark.</i> Two or more copied assignments will carry zero mark in all assignments. Zero tolerance will be shown in this regard. Solutions to assignment problems will be provided through web and on hand.																								
		Lab Performance	There will be at least six lab performance evaluations. These will be taken as per the weekly schedule. During evaluation, following instructions will be strictly maintained: 1. Every student is expected to be regular in Lab classes. 2. Do NOT copy lines of code from anybody else. 3. Do NOT ask to see another student’s code. 4. Do NOT pass code or program to other members of the class 5. If the instructor is at all uncomfortable about the originality of student’s work, no mark will be given. 6. There will be no make-up evaluation of lab performance (except, at the discretion of the instructor, in the case of documented medical or family emergencies).																								

		Project	<p>Introduction</p> <p>In this course CSE - 352, you will develop a small scale project exploiting the technology and features of Python.</p> <p>Instructions</p> <ul style="list-style-type: none"> • Project must be based on advanced knowledge of AI and Python programming in order to use modern AI tools and techniques. • You can propose your project proposal but that must be up to the standard. • Focus on real life problems while finalizing your proposal. <p>Problem Definition</p> <p>In your project report you should present the situation you have tackled while implementing your project and how you managed to solve it. Your document should start by:</p> <ul style="list-style-type: none"> • Illustrate the problem. • Specify how you will solve the problem. • You must have at least five features for your intended project. • Mention the object oriented principles (Encapsulation, Polymorphism, Inheritance, Abstraction) used in your project. <p>Design and Programming</p> <ul style="list-style-type: none"> • You can use standard packages, but provide proper reference in the report. • You may use python (or other language) to write program by exploiting AI models in your project. • The graphical user interface is not mandatory but for representation purpose you can incorporate it. • Your data in your project report. <p>Team Work</p> <ul style="list-style-type: none"> • A group can be formed with maximum three members • Every member of a group should have equal contribution to the project (N.B. They will be asked about their individual role) <p>Project Submission</p> <p>Remember to properly indent your code and add comments as required before submitting your full project source code. You also have to submit your Project report, Project presentation Slide along with your project source code.</p> <p>Note:</p> <p>By following the above points, you will be meeting the basic requirements. Make sure the Project report reflects also good word-processing skills (headers/footers/page numbering, etc.) as marks will be rewarded for that as well in your report.</p>
24	Additional Information	<p>a. Academic Calendar Summer 2020: http://www.bubt.edu.bd/academics/academic-calendar.</p> <p>b. Academic Policies: http://www.bubt.edu.bd/academics/academic-rules-a-regulations.</p> <p>c. Grading & Evaluation: http://www.bubt.edu.bd/academics/academic-rules-a-regulations.</p> <p>d. Proctorial Rules: http://www.bubt.edu.bd/administrator/proctors-office.</p>	
25		<p>Bloom's Taxonomy for Teaching-Learning</p> <p>Bloom's Taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three lists cover the learning objectives in Cognitive, Affective and Psychomotor domains. The Cognitive domain list has been the primary focus of most education and is frequently used to structure curriculum learning objectives, assessments and activities. The three domains and respective levels are illustrated below.</p>	

	Cognitive [C] (Knowledge-based)		Affective [A] (Emotion-based)	Psychomotor [P] (Action-based)
	1. Remembering		1. Receiving	1. Perception
	2. Understanding		2. Responding	2. Set
	3. Applying		3. Valuing	3. Guided Response
	4. Analyzing		4. Organizing	4. Mechanism
	5. Evaluating		5. Characterizing	5. Complex Overt Response
	6. Creating			6. Adaptation
	-			7. Origination
26	Descriptions of Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001): The cognitive domain involves the development of our mental skills and the acquisition of knowledge.			
	Level	Category	Meaning	Keywords
	C1	Remembering	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
	C2	Understanding	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
	C3	Applying	Carrying out or using a procedure through executing, or implementing. Applying relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
	C4	Analyzing	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure
	C5	Evaluating	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation.	Appraise, argue, assess, choose, conclude, critique, decide, evaluate, judge, justify, predict, prioritize, prove, rank, rate, select, Monitor
	C6	Creating	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce
27	Descriptions of Affective Domain (Krathwohl, Bloom, Masia, 1973) The affective domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes.			
	Level	Category	Meaning	Keywords
	A1	Receiving	Awareness, willingness to hear, selected attention.	acknowledge, asks, attentive, courteous, dutiful, follows, gives, listens, understands

	A2	Responding	Active participation on the part of the learners. Attend and react to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation).	answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, presents, tells
	A3	Valuing	The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment. Valuing is based on the internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable.	appreciates, cherish, treasure, demonstrates, initiates, invites, joins, justifies, proposes, respect, shares
	A4	Organizing	Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating an unique value system. The emphasis is on comparing, relating, and synthesizing values.	compares, relates, synthesizes
	A5	Characterizing	Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and most important characteristic of the learner. Instructional objectives are concerned with the student's general patterns of adjustment (personal, social, emotional).	acts, discriminates, displays, influences, modifies, performs, qualifies, questions, revises, serves, solves, verifies

28	Descriptions of Psychomotor Domain (Simpson, 1972) The psychomotor domain includes physical movement, coordination, and use of the motor-skill areas. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.			
	Level	Category	Meaning	Keywords
	P1	Perception	The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects.
	P2	Set	Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets).	begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.
	P3	Guided Response	The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.	copies, traces, follows, react, reproduce, responds
	P4	Mechanism	This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.
	P5	Complex overt Response	The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance.	assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.
	P6	Adaptation	Skills are well developed and the individual can modify movement patterns to fit special requirements.	adapts, alters, changes, rearranges, reorganizes, revises, varies.
	P7	Origination	Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	arranges, builds, combines, composes, constructs, creates, designs, initiate, makes, originates.
29	Graduate Attributes (Program Outcomes) for B.Sc. in Engineering Program based on Washington Accord			

	<p>Program Outcomes (POs) are narrower statements that describe what students are expected to know and be able to do by the Time of graduation. These relate to the knowledge skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in CSE program are expected to achieve the following graduate attributes or program outcomes at the time of graduation.</p> <p>PO1–Engineering knowledge (Cognitive): Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.</p> <p>PO2–Problem analysis (Cognitive): Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.</p> <p>PO3–Design/development of solutions (Cognitive, Affective): 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.</p> <p>PO4–Investigation (Cognitive, Psychomotor): Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.</p> <p>PO5–Modern tool usage (Psychomotor, Cognitive): 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.</p> <p>PO6–The engineer and society (Affective): Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.</p> <p>PO7–Environment and sustainability (Affective, Cognitive): Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.</p> <p>PO8–Ethics (Affective): Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.</p> <p>PO9–Individual work and teamwork (Psychomotor, Affective): Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.</p> <p>PO10–Communication (Psychomotor, Affective): 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.</p> <p>PO11–Project management and finance (Cognitive, Psychomotor): 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.</p> <p>PO12–Life-long learning (Affective, Psychomotor): Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.</p>		
30	Social & Moral Capital		
	<p>Our promises are based on the three cardinal principles: (a) What we do believe (b) What we do practice, and (c) What we will promote</p> <p>However, students are advised to undertake the following commitments for moral development.</p>		
	<ol style="list-style-type: none"> 1. To be punctual and attentive in class 2. To maintain inclusive learning environment 3. To ensure mutual respect 4. To be cooperative in group learning. 5. To be innovative and Creative 6. To follow dress code and wearing ID card 7. To be always proactive 	<ol style="list-style-type: none"> 8. Try to follow and review day to day class 9. To avoid conspiracy 10. To prioritize honesty & faith 11. To be motivated for asking question and encourage feedback 12. To develop attitude for speaking in English 13. Do not ignore to carry out any assignments or commitments 14. To be clean and decent in all levels. 	<ol style="list-style-type: none"> 15. To be sincere for class preparation 16. Do not forget to switch-off the cell phone in class 17. Do not forget to carry course pack and learning stuffs in class 18. To maintain loyalty and trust to the university 19. Must avoid unfair means and plagiarism in exam, reports and assignments 20. Must maintain eco-friendly environment in the campus.

Prepared by:

Checked by:

Approved by: