



National Computing Education Accreditation Council NCEAC



NCEAC.DOC.001-E

COURSE DESCRIPTION

NAME OF INSTITUTION	Lahore Garrison University
PROGRAM (S) TO BE EVALUATED	Computer Science , Fall 2022

Course Description :

Course Code	CSC368															
Course Title	Machine Learning															
Credit Hours	3+0															
Prerequisites by Course(s) and Topics	No prerequisites of the course															
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	SESSIONAL (Quizzes, Assignments, Presentations) =25 % Midterm Exam =25 % Final Exam = 50%															
Course Coordinator	Miss Unaiza Tallal															
URL (if any)																
Current Catalog Description	Machine Learning is a branch of Computer Science that uses algorithms to imitate the way in which humans learn. ... Machine learning is one of the most in-demand Data Science skills, which allows data scientists to increase the accuracy of predictions of software applications, without explicitly programming them to do so.															
Textbook (or Laboratory Manual for Laboratory Courses)	Pattern Recognition & Machine Learning, 1st Edition, Chris Bishop															
Reference Material	Practical Machine Learning with Python: A Problem-Solver's Guide to Building Real-World Intelligent Systems 1st ed. Edition by Dipanjan Sarkar (Author), Raghav Bali (Author), Tushar Sharma (Author)															
Course Goals	"Analytics must aim to deliver insight to change the way you do business"The primary aim of machine elarning is to make machines independent by training them on datasets so that the machine will be able to predict what is unknown to us.															
Course Learning Outcomes (CLOs):	<table><tr><td>At the end of the course the students will be able to:</td><td>Domain</td><td>BT Level*</td></tr><tr><td>Describe the learning pattern of computer from experience</td><td>C</td><td>C= 2</td></tr><tr><td>Interpret the statistical techniques for classification and to measure the outcome</td><td>C,P</td><td>C=3, P=4</td></tr><tr><td>Design a machine learning model for the given dataset to solve a particular problem and explain in groups</td><td>C,P,A</td><td>C=6, P=7, A= 4</td></tr><tr><td colspan="3">* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain</td></tr></table>	At the end of the course the students will be able to:	Domain	BT Level*	Describe the learning pattern of computer from experience	C	C= 2	Interpret the statistical techniques for classification and to measure the outcome	C,P	C=3, P=4	Design a machine learning model for the given dataset to solve a particular problem and explain in groups	C,P,A	C=6, P=7, A= 4	* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		
At the end of the course the students will be able to:	Domain	BT Level*														
Describe the learning pattern of computer from experience	C	C= 2														
Interpret the statistical techniques for classification and to measure the outcome	C,P	C=3, P=4														
Design a machine learning model for the given dataset to solve a particular problem and explain in groups	C,P,A	C=6, P=7, A= 4														
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain																

Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)	Week	Lecture	Topics Covered
	Week 1	1	Artificial Intelligence, Introduction to Machine Learning, Its implications with real-world examples, Concept of self-learning
		2	Types of learning{ Supervised learning (Classification, Regression), Unsupervised learning, Reinforcement learning)
	Week 2	3	Statistical Analysis of data (Descriptive & Predictive), Data Collection(Numerical data, Categorical data)
		4	Data Preprocessing and its techniques (Data cleaning, Data integration, Data Argumentation, Data reduction, Data transformation)
	Week 3	5	Implementation of data preprocessing using python, Introduction to python libraries
		6	Feature extraction intuition--PCA
	Week 4	7	Regression problem Linear Regression (linear equation, slop of the line, relationship between attributes, intercept, ordinary least square, residual error)
		8	Implementation of simple linear regression Evaluate the relation between attributes using plotting.
	Week 5	9	Multiple linear regression (Dummy variable, multicollinearity, dummy variable trap, building a model using backward elimination)
		10	Implementation of multiple linear regression using stat library in python.
	Week 6	11	Polynomial Regression and implementation(Degree of polynomial)
		12	Logistic Regression intuition and real-world example
	Week 7	13	Supervised Algorithm-Naïve Bayes (Conditional probability, Bayes theorem) Derive theorem mathematically
		14	Decision Tree (Entropy, information gain) Mathematical implementation using dataset on python
	Week 8	1 hours	Mid Term
	Week 9	15	Support vector machine (linearly separable data, non-linearly separable data) Linear SVM implementation using example
		16	Kernel function intuition (RBF kernel function, Sigmoid function) Implementation of SVM
	Week 10	17	K-nearest neighbor intuition and solved example using real-world dataset.
		18	Implementation of K-NN
	Week 11	19	MID EXAMINATIONS
		20	MID EXAMINATIONS
	Week 12	21	Unsupervised learning, Clustering (k-mean clustering intuition- k mean++, the elbow method implementation using example)
		22	Implementation of K-mean EM Algorithm/DBSCAN intuition
	Week 13	23	Ensemble learning (Bagging, Boosting) Bagging(Bootstrap aggregation, row sampling with replacement), Random forest
		24	Bias-Variance trade off, Boosting (Adaboost)
	Week 14	25	Stacking Optimization algorithm (Gradient Descent, Stochastic Gradient Descent)
		26	Evaluation Matrices, Reinforcement learning (Tuning model complexity)
	Week 15	27	Natural language processing (Bag of words, stemming, lemmatization)
		28	Implementation of NLP using dataset using python
	Week 16	29	Neural network (how brain works, perceptron, the neuron)
		30	Activation function (SDG) Back propagation intuition and numerical
	Week 17	2 hours	Final Term
Laboratory Projects/Experiments Done in the Course			
Programming Assignments Done in the Course			

Instructor Name Miss Unaiza Tallal

Instructor Signature

