GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Bachelor of Vocation (B.Voc), 6th Semester
Branch: Software Development
Subject Name: Introduction to AI & ML
Subject Code: 21160201

Type of course: Core

Prerequisite: Mathematics

Rationale: With increasing usage of Internet, the importance of Artificial Intelligence (AI) and Machine Learning (ML) can be seen in many areas which directly affect human life. Artificial Intelligence is the science and engineering which makes machines intelligent. A subset of AI, Machine Learning (ML) is the area of Computational Science that focuses on analyzing and interpreting structures and patterns in data to enable learning, reasoning and decision making. The AI and ML technologies bring more complex data analysis features to existing applications, therefore students should learn various ML approaches to build new solutions for various real-life problems.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	50	0	0	0	50

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End SemesterExamination; PA- Progressive Assessment

Content:

Sr. No.	Content	Teaching Hrs.	Module % Weightage
1.	**Introduction to AI** - Defining Artificial Intelligence, Defining AI techniques, Using Predicate Logic and Representing Knowledge as Rules, Representing simple facts in logic, Computable functionsand predicates, Procedural vs Declarative knowledge, Logic Programming, Mathematical foundations: Matrix Theory and Statistics for Machine Learning.	12	20
2.	**Introduction to ML**- Idea of Machines learning from data, Classification of problem –Regression and Classification, Supervised and Unsupervised learning	08	20
3.	**Linear Regression**- Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Gradient Decent in practice.	10	20
4.	**Logistic Regression**- Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification (One vs. All), Problem of Over fitting.	07	20

5	**Clustering algorithms-** Discussion on clustering algorithms and use-cases cantered around clustering and classification.	05	20
	Total	42	100

Reference Books:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011.
2. Anindita Das Bhattacharjee, "Practical Workbook Artificial Intelligence and Soft Computing forbeginners, Shroff Publisher-X team Publisher.
3. Yuxi (Hayden) Liu, "Python Machine Learning by Example", Packet Publishing Limited, 2017.
4. Tom Mitchell, Machine Learning, McGraw Hill, 2017.
5. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2011.
6. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2011.

Suggested Specification Table with Marks (Theory): (For BVOC only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	0	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C:Create and above Levels (Revised Bloom's Taxonomy)

Course Outcomes:

Sr. No.	CO Statement	Marks % Weightage
CO-1	Summarize knowledge, logic fundamentals and associate it with mathematical basics.	20
CO-2	Examine and implement machine learning solutions to classification, regression	20
CO-3	Evaluate and interpret the results of the different ML techniques	20
CO-4	Classify and analyze linear and logistic regression techniques	20
CO-5	Compare and Design various machine learning algorithms in a range of Real world applications	20

List of Open Source Software/learning website:

Students must refer to following sites to enhance their learning ability.

- https://www.datacamp.com
- https://www.edx.org/
- https://medium.com/
- https://www.ibm.com/topics/machine-learning