Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Oral	Tutorial	Total
IoTCSBCL 701	ML & Blockchain Lab	--	2	--	--	2	--	2

Subject Code	Subject Name	Examination Scheme						
		Theory Marks				Term Work	Oral	Total
		Internal assessment			End Sem. Exam			
		Test1	Test 2	Avg. of 2 Tests				
IoTCSBCL 701	ML & Blockchain Lab	--	--	--	--	25	25	50

Lab Objectives:

Sr. No.	Lab Objectives
The course aims:	
1	To introduce the basic concepts of tools and techniques of Machine Learning.
2	To acquire in-depth understanding of various supervised and unsupervised machine learning algorithms.
3	To be able to apply various ensemble techniques for combining Machine Learning models and also demonstrate dimensionality reduction techniques.
4	To be able to understand fundamental of blockchain technology.
5	To be able to apply understanding of consensus algorithms and smart contract programming.
6	To be able to collate blockchain based solutions towards various industry-based application.

Lab Outcomes:

Sr. No.	Lab Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
On successful completion, of course, learner/student will be able to:		
1	To interpret and conceptualize the basic concepts of tools and techniques of Machine Learning.	L2
2	To demonstrate machine learning algorithms with complex datasets	L3
3	To understand fundamental neural network architecture and concepts.	L2
4	To examine fundamental concepts of block chain technology and consensus algorithm	L4
5	To develop smart contracts	L6
6	To collate blockchain based solutions towards various industry-based application.	L6

Prerequisite: Must have completed the course on Introduction to Linear Algebra and have basic familiarity with probability theory and basics of programming language.

Sr. No.	Suggested list of Assignments	LO
1	To implement Supervised Learning using Linear regression algorithm	LO1
2	To implement Supervised Learning using Logistic regression algorithm	LO1
3	To implement PCA / SVD / LDA	LO2
4	To implement Decision Tree Algorithms	LO2
5	To implement Graph based clustering and CART algorithm	LO2
6	To implement a Simple Neural Network using backpropogation.	LO3
7	To study installation tools and basic blockchain concepts.	LO4
8	To implement Smart contracts using Solidity/Python/ Java language.	LO5
9	To implement Smart contracts using Solidity/Python/ Java language.	LO5
10	To design and implement Mini-project on Machine Learning / Blockchain topics	LO6

Text Books:
1. Shai Shalev-Shwartz; Shai Ben-David, MACHINE LEARNING From Theory to Algorithms, Cambridge University Press, 2014
2. Sebastian Raschka; Yuxi (Hayden) Liu, Vahid Mirjalili, Machine Learning with PyTorch and Scikit-Learn, PackT, 2022
3. Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain A Beginner's Guide to Building Blockchain Solutions, Apress, 2018
4. Sandeep Kumar Panda, Vaibhav Mishra, Sujata Priyambada Dash, Ashis Kumar Pani, Recent Advances in Blockchain Technology Real-World Applications, Springer, 2023
5. Artificial Intelligence and Data Mining Approaches in Security Frameworks Editor(s):Neeraj Bhargava, Ritu Bhargava, Pramod Singh Rathore, Rashmi Agrawal, 2021.

References:
1. Sebastian Raschka, Vahid Mirjalili Python Machine Learning, 3rd Edition, 2019, Packt
2. Machine Learning: A Probabilistic Perspective, Kevin P Murphy, MIT Press.
3. Christopher M. Bishop. Pattern Recognition and Machine Learning. Springer 2006.
4. Tom Mitchell. Machine Learning. McGraw Hill, 1997.
5. Arjuna Sky Kok, Hands-on Blockchain for Python Developers, 2019, Packt

Online References and MOOC Courses:
1. https://www.toptal.com/ethereum/one-click-login-flows-a-metamask-tutorial
2. What Is Machine Learning in Security? - Cisco
3. https://www.mdsny.com/5-top-machine-learning-use-cases-for-security/
4. https://trufflesuite.com/docs/truffle/how-to/truffle-with-metamask/
5. https://remix-ide.readthedocs.io/en/latest/index.html
6. https://nptel.ac.in/courses/106/106/106106139/
7. https://nptel.ac.in/courses/106/106/106106202/
8. https://www.classcentral.com/course/independent-machine-learning-security-12651

Assessment:
Term Work: Term Work shall consist of at least 10 practicals based on the above list. Also Term work Journal must include at least 2 assignments.

Term Work Marks: 25 Marks (Total marks) = 15 Marks (Experiment) + 5 Marks (Assignments) + 5 Marks (Attendance)

Oral Exam: An Oral exam will be held based on the above syllabus.