SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

Academic Year : Moderate-M Strong-H Weak-L Institute/ Branch Name : Symbiosis Institute of Technology Programme Name : Master of Technology (AIMLEngineering)

Color Code Description:		
Global	National / Local	Regional / National

Academic Year : 2023-2024 Institute/ Branch Name : Symbiosis Institute of Technology Programme Name : Master of Technology (AIML Engineering)

Global | National / Local | Regional / National

Sr.	GA No.	Graduate Attributes	PO No.	Programme Outcomes	Relevance
1	GA1	Scholarship: research, inquiry and lifelong learning	PO01	An ability to independently carry out research /investigation and development work to solve practical problems.	National / Local
2	GA2	Global citizenship: ethical, social and professional understanding	PO02	An ability to write and present a substantial technical report/document.	National / Local
3	GA3	Eco-literate: sensitivity towards a sustainable environment	PO03	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor's program.	Global
4	GA4	Employability: equipped with skills, attributes, leadership and entrepreneurial qualities that society needs; being capable of making a contribution to society through earning a living	PO04	Devise and apply appropriate techniques and modern engineering tools to complex engineering activities with an understanding of its limitations.	Regional/National
5	GA4	Employability: equipped with skills, attributes, leadership and entrepreneurial qualities that society needs; being capable of making a contribution to society through earning a living	PO05	Recognize the need for and an ability to engage in lifelong learning to keep oneself abreast of the knowledge to be competent.	Global
6	GA4	Employability: equipped with skills, attributes, leadership and entrepreneurial qualities that society needs; being capable of making a contribution to society through earning a living	PSO1	To apply the concepts of Artificial Intelligence and Machine Learning with practical knowledge in analysis, design and development of intelligent systems and applications to multi-disciplinary problems.	Regional/National
7	GA2	Eco-literate: sensitivity towards a sustainable environment	PSO2	To provide a concrete foundation to the students in the cutting edge areas Artificial Intelligence and Machine Learning and excelling in the specialized areas like Natural Language Processing, Computer Vision, Reinforcement Learning, Internet of Things, Cloud computing, Data Security and privacy etc.	National / Local

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7	GA2	Eco-literate: sensitivity towards a sustainable environment	PSO2	To provide a concrete foundation to the students in the cutting edge areas Artificial Intelligence and Machine Learning and excelling in the specialized areas like Natural Language Processing, Computer Vision, Reinforcement Learning, Internet of Things, Cloud computing, Data Security and privacy etc.	National / Local

Sr. No.	Semester	Institute Course Code	Catalog Course Code	Title	Course Outcomes No.	Course Outcome Statement	PO01	PO02	PO03	PO04	PO05	PSO1	PSO2
1	1	070126	TE7495	Programming in Python	CO1	Learn the fundamental concepts in Python and its application in real-time computing scenario.	Moderate-M	Moderate-M	Moderate-M	Weak-L	Weak-L	Weak-L	Weak-L
					CO2	Implement the fundamental Scientific computing, Data Visualization and Algorithmic Libraries in Python	Moderate-M	Moderate-M	Moderate-M	Weak-L	Moderate-M	Weak-L	Weak-L
					CO3	Implement and demonstrate Deep Learning Packages like Tensorflow, Keras , pytorch.	Moderate-M	Moderate-M	Moderate-M	Weak-L	Weak-L	Weak-L	Weak-L
					CO4	Demonstrate a python project in any of the industry application using Machine Learning algorithms.	Moderate-M	Moderate-M	Moderate-M	Weak-L	Weak-L	Weak-L	Weak-L
2	1	070126	TE7682	Maths for Data Science	CO1	Discuss the basics of vector space and linear combination	Strong-H	Moderate-M	-	Weak-L	-	-	-
					CO2	Apply the elementary matrix theory to compute Eigen values and Eigen vectors for diagonalization	Strong-H	Moderate-M	-	Weak-L	-	-	-
					CO3	Illustrate SVD-based analysis methods and its connectivity with multivariate analysis	Strong-H	Strong-H	-	Strong-H	-	-	-
					CO4	Determine probability theory , methods of parametric estimation and explain regression and correlation analysis.	Strong-H	Strong-H	-	Strong-H	-	-	-
3	1	070126	TE7912	Supervised Machine Learningand Advances	CO1	Explore and apply Machine Learning concepts, practical applications, and adept at dataset handling.	Strong-H	Moderate-M	Moderate-M	Weak-L	Strong-H	Weak-L	Moderate-M
					CO2	Apply regression techniques, evaluation measures, and regularization methods to make accurate predictions	Strong-H	Weak-L	Moderate-M	Moderate-M	Strong-H	Weak-L	Moderate-M
					CO3	Proficiency in classification and prediction with linear, non-linear classifiers, ensemble methods, and evaluation metrics.	Strong-H	Moderate-M	Moderate-M	Moderate-M	Strong-H	Weak-L	Moderate-M
					CO4	Demonstrate the project based on Regression or Classification Techniques.	Strong-H	Strong-H	Strong-H	Moderate-M	Strong-H	Weak-L	Moderate-M
4	1	070126	TE7913	Supervised Machine Learning and Advances Lab	CO1	To learn the basic implementation of ML techniques.	Moderate-M	Moderate-M	Moderate-M	-	-	Moderate-M	Moderate-M
					CO2	Able to do perform an experiment on regression	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M
					CO3	Able to perform an experiments on classification	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M
					CO4	Able to do apply suitable ML technique in real world applications	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M
5	1	070126	TE7894	Exploratory Data Analysis	CO1	Experiment data preprocessing, label encoding,one-hot encoding, identification of data with the selected dataset.	Strong-H	-	-	Strong-H	-	Strong-H	Strong-H
					CO2	proficiently apply basic visualization tools for analyzing categorical and quantitative data using Univariate, BiVariate, Multi-Variate.	-	-	Strong-H	--		Strong-H	Strong-H
					CO3	proficiently apply advanced multivariate analysis techniques to unravel patterns and trends in complex datasets, contributing to data-driven decision-making.	-	-	-	Strong-H	-	Strong-H	Strong-H
					CO4	demonstrate effective communication skills through clear and concise writing in academic papers and presentations, adeptly utilizing visual aids such as PowerPoint slides to enhance understanding and engagement.	-	Strong-H	-	-	Strong-H	Strong-H	Strong-H
6	1	070126	TE7914	Unsupervised Machine Learning and Advances	CO1	Analyse the data from multidisciplinary Application domains using Statistical techniques	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Moderate-M	Moderate-M
					CO2	Solve a problem using Sensor Analytics applied to various domains	Moderate-M	Moderate-M	Moderate-M	Weak-L	Weak-L	Moderate-M	Moderate-M
					CO3	Understand and Apply advanced AI/ML techniques to multidisciplinary domains	Moderate-M	Moderate-M	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M
					CO4	Apply suitable ML/DL technique in real world applications	Moderate-M	Moderate-M	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M
7	1	070126	TE7915	Unsupervised Machine Learning and Advances Lab	CO1	Explain the key techniques and the theory behind data visualization.	Moderate-M	Moderate-M	Moderate-M	Strong-H	Strong-H	Moderate-M	Strong-H
					CO2	Illustrate use of various visualization tools like PowerBI effectively (like tables, charts, spatial data, time series, trees and networks, etc.)	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO3	Design and develop data visualization dashboards for real world data.	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO4	Formulate and tell a story about the real world data using the dashboard.	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
8	1	070126	TE7903	Introduction to Deep Learning	CO1	Students will be able to-Discuss various Deep Learning concepts, principles, algorithms and concepts	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Describe all concepts related to NN which will be useful for DL applications	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Summarize various DL models and deep NN	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Give examples of various optimization algorithms	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO5	Discuss and extend CNN and RNN concepts	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
9	1	070126	TE7904	Introduction to Deep Learning Lab	CO1	Students will be able to- Understand and learn the deep learning and related libraries like Tensorflow, Keras.	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Design and implement concepts of ANN using Tensor Flow.	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Design and implement CNN, RNN using TensorFlow for a case study.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Learn deep learning-based NLP	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO5	Practice implementation of cloud based deep learning deployment	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
10	1	070126	TE7893	Data Visualization Tools and Software	CO1	Explain the key techniques and the theory behind data visualization.	Moderate-M	Moderate-M	Moderate-M	Strong-H	Strong-H	Moderate-M	Strong-H
					CO2	Illustrate use of various visualization tools like PowerBI effectively (like tables, charts, spatial data, time series, trees and networks, etc.)	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO3	Design and develop data visualization dashboards for real world data.	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO4	Formulate and tell a story about the real world data using the dashboard.	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
11	1	070126	TE7902	Implementations and Use Cases of Machine Learning Lab	CO1	Analyse the data from multidisciplinary Application domains using Statistical techniques	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Moderate-M	Moderate-M
					CO2	Solve a problem using Sensor Analytics applied to various domains	Moderate-M	Moderate-M	Moderate-M	Weak-L	Weak-L	Moderate-M	Moderate-M
					CO3	Understand and Apply advanced AI/ML techniques to multidisciplinary domains	Moderate-M	Moderate-M	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M
					CO4	Apply suitable ML/DL technique in real world applications	Moderate-M	Moderate-M	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M
12	2	070126	TE7901	Graph Neural Networks	CO1	Understand fundamental concepts of graph and its applications	Moderate-M	Weak-L	-	-	-	-	-
					CO2	Able to design the pipeline of Machine learning for graph	Moderate-M	Weak-L	Weak-L	-	-	-	-
					CO3	Understand the theories, models, and concepts of node	Moderate-M	Moderate-M	Moderate-M	-	-	-	-
					CO4	Able to design the pipeline for graph neural network	Moderate-M	Moderate-M	Moderate-M	-	-	-	-
					CO5	Describe Knowledge graphs and their applications	Moderate-M	Moderate-M	Moderate-M	-	-	-	-
13	2	070126	F7077	Big Data and MLOps	CO1	Understand the fundamentals of big data technologies and Hadoop ecosystem	-	-	-	Strong-H	-	-	-
					CO2	Illustrate the working architecture and applications of Apache Spark	-	-	Moderate-M	-	-	Strong-H	-
					CO3	Compare and contrast between different SPARk libraries.	Moderate-M	Weak-L	-	-	-	-	Moderate-M
					CO4	Describe the working of MLOPS architectures	-	-	-	-	Strong-H	Strong-H	-
14	2	070126	TE7899	Generative Adversarial Networks and Applications	CO1	Interpret and apply the fundamental concepts associated with GANs methods.	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Apply the basic principles to derive the various Generator and Discriminator Networks	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Understand and choose various approaches based on the specific application for designing G and D networks and corresponding loss functions.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Devise the GANs based applications for image to text translation, image generation etc.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L

					CO5	Contrast and Correlate and validate the GAN variants for specific applications.	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
15	2	070126	TE7900	Generative Adversarial Networks and Applications Lab	CO1	Interpret and apply the fundamental concepts associated with GANs methods.	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Apply the basic principles to derive the various Generator and Discriminator Networks	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Understand and choose various approaches based on the specific application for designing G and D networks and corresponding loss functions.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Devise the GANs based applications for image to text translation, image generation etc.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO5	Contrast and Correlate and validate the GAN variants for specific applications.	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
16	2	070126	TE7908	Natural Language Processingand Applications	CO1	Understand the fundamental concepts and applications of NLP.	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Strong-H	Strong-H
					CO2	Demonstrate the understanding of various word embedding techniques and its application in NLP	Strong-H	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Strong-H	Strong-H
					CO3	Describe the application of deep learning techniques such as RNN, LSTM for NLP tasks.	Strong-H	Moderate-M	Moderate-M	Strong-H	Moderate-M	Strong-H	Strong-H
					CO4	Illustrate the working of Machine translation and text classification techniques.	Strong-H	Moderate-M	Moderate-M	Strong-H	Moderate-M	Strong-H	Strong-H
17	2	070126	TE7909	Natural Language Processing and Applications Lab	CO1	Apply and demonstrate the basic concepts of NLP	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H
					CO2	Distinguish and illustrate various approaches to vectorization and embeddings for NLP tasks	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO3	Understand and apply the various DL and ML methods for NLP problems	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M	Moderate-M
					CO4	Distinguish and illustrate the end-to-end implementation pipeline for NLP research problems	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
18	2	070126	TE7906	Machine Vision	CO1	Demonstrate a solid understanding of the fundamental principles of machine vision and its applications in industry.	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Apply image processing techniques to solve common problems in image analysis, including noise reduction, feature extraction, and image enhancement.	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Design and implement machine vision algorithms for object detection and recognition using modern software tools.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Integrate machine vision systems with hardware components and evaluate their performance in real-world scenarios.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO5	Utilize machine learning methods to improve the accuracy and efficiency of machine vision systems for Object Detection problems.	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
19	2	070126	TE7907	Machine Vision Lab	CO1	Demonstrate a solid understanding of the fundamental principles of machine vision and its applications in industry.	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Apply image processing techniques to solve common problems in image analysis, including noise reduction, feature extraction, and image enhancement.	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Design and implement machine vision algorithms for object detection and recognition using modern software tools.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Integrate machine vision systems with hardware components and evaluate their performance in real-world scenarios.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO5	Utilize machine learning methods to improve the accuracy and efficiency of machine vision systems for Object Detection problems.	Moderate-M	Moderate-M	Moderate-M	-	Weak-L	Weak-L	Weak-L
20	2	070126	TE7659	Technical Communication Skills	CO1	Sketch communicative knowledge for effective interpersonal, business, technical, intercultural	Weak-L	Strong-H	-	-	Weak-L	-	-
					CO2	Demonstrate linguistic competence and employ communication etiquettes through enhanced	Moderate-M	Moderate-M	-	-	Weak-L	-	-
					CO3	Construct and draft effective Proposals, Manuals and research papers.	Moderate-M	Strong-H	-	-	Weak-L	-	-
					CO4	Constructing sentences effectively using grammar, punctuation and vocab with reference to effective formal business/technical communication.	Weak-L	Moderate-M	-	-	Weak-L	-	-
					CO5	Design impactful resumes, memos, reports, emails and business letters.	Moderate-M	Strong-H	-	-	Weak-L	-	-
21	2	070126	TE7905	Machine Learning and Bioinspired Optimization Techniques	CO1	Find the most optimal solution for a problem with given constraints	Moderate-M	Moderate-M	Weak-L	-	Weak-L	Weak-L	Weak-L
					CO2	Use classical optimization techniques and numerical methods of optimization	Moderate-M	Moderate-M	Weak-L	-	-	Weak-L	Weak-L
					CO3	Apply K Means algorithm to find distinct groups or "clusters" within a data set, and can optimize parameter using PSo or GA optimization techniques.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
					CO4	Apply KNN and Neural Network algorithms for classification and compare the result with different optimizers, algorithms used as parameters to tune these algorithms.	Moderate-M	Moderate-M	Moderate-M	-	-	Weak-L	Weak-L
22	2	070126	T4005	Integrated Disaster Management	CO1	To enable studentunderstand varioustypes of disasters,its preparednessand management.	Weak-L	Weak-L	Weak-L	Weak-L	Moderate-M	-	-
					CO2	To instill knowledgeon reducingdisasters andcapacity buildingthrough communityparticipation.	Weak-L	Weak-L	Moderate-M	Weak-L	Weak-L	-	-
					CO3	To train students toperform First aidand CPR in an emergency.	Weak-L	Weak-L	Moderate-M	Moderate-M	Weak-L	-	-
23	2	070126	TE7910	Reinforcement Learning and Applications	CO1	Explain the fundamental concepts of RL, including the agent environment interaction, rewards, policies, value functions, and the notion of learning through trial and error.	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO2	Implement dynamic programming algorithms like value iteration and policy iteration.	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO3	Implement model-free RL algorithms like Q-Learning and SARSA	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO4	Integrate deep learning with RL using Deep Q-Networks (DQN)	Moderate-M	Moderate-M	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
24	2	070126	TE7911	Reinforcement Learning and Applications Lab	CO1	Explain the fundamental concepts of RL, including the agent-environment interaction, rewards, policies, value functions, and the notion of learning through trial and error.	Strong-H	Weak-L	-	-	-	Strong-H	Moderate-M
					CO2	Implement dynamic programming algorithms like value iteration andpolicy iteration.	Strong-H	Moderate-M	Weak-L	-	-	Strong-H	Moderate-M
					CO3	Implement model-free RL algorithms like Q-Learning and SARSA	Strong-H	Moderate-M	Weak-L	-	-	Strong-H	Moderate-M
					CO4	Integrate deep learning with RL using Deep Q-Networks (DQN)	Strong-H	Moderate-M	Weak-L	-	-	Strong-H	Moderate-M
25	3	070126	TE7710	Dissertation Phase 1	CO1	Define the scope and purpose of the research problem: Articulate the problem statement, research objectives, and scope of the research project.	-	-	Moderate-M	Weak-L	Strong-H	Strong-H	Moderate-M
					CO2	Conduct extensive literature review: Investigate existing research methods in the literature relevant to the topic, identify relevant datasets and research gaps, and state future research directions through a detailed literature review	Moderate-M	-	Strong-H	Moderate-M	Strong-H	Strong-H	Strong-H
					CO3	Design and develop methodological framework: Design and develop artificial intelligence and machine learning-based solutions for the real-world problems society and various industries face.	Strong-H	-	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO4	Create project reports and/or research articles: Create a technical project report and/or research paper in adherence to the highest research standards and ethical practices.	-	Strong-H	-	Strong-H	Strong-H	Moderate-M	Moderate-M
					CO5	Demonstrate professional and communication skills: Demonstrate professional skills through project planning, presentation, execution, and effective communication skills.	-	-	-	-	Strong-H	-	-
26	3	070126	F7050	Full Stack Development and Applications	CO1	Design an interactive webpage	-	-	-	-	-	-	-
					CO2	Validate the web page on the client and server side.	-	-	-	-	-	-	-
					CO3	Implement the database connectivity with frontend	-	-	-	-	-	-	-
					CO4	Develop an application with the concept of Node.js and React.js	-	-	-	-	-	-	-
27	4	070126	TE7714	Dissertation Phase 2	CO1	Define the scope and purpose of the research problem: Articulate the problem statement, research objectives, and scope of the research project.	-	-	Moderate-M	Weak-L	Strong-H	Strong-H	Moderate-M
					CO2	Conduct extensive literature review: Investigate existing research methods in the literature relevant to the topic, identify relevant datasets and research gaps, and state future research directions through a detailed literature review	Moderate-M	-	Strong-H	Moderate-M	Strong-H	Strong-H	Strong-H
					CO3	Design and develop methodological framework: Design and develop artificial intelligence and machine learning-based solutions for the real-world problems society and various industries face.	Strong-H	-	Strong-H	Strong-H	Strong-H	Strong-H	Strong-H
					CO4	Create project reports and/or research articles: Create a technical project report and/or research paper in adherence to the highest research standards and ethical practices.	-	Strong-H	-	Strong-H	Strong-H	Moderate-M	Moderate-M
					CO5	Demonstrate professional and communication skills: Demonstrate professional skills through project planning, presentation, execution, and effective communication skills.	-	-	-	-	Strong-H	-	-