E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A++' Grade | Accredited by NBA (BE- CIVIL, CSE, ECE, EEE, MECH & IT)

NAGAPATTINAM – 611 002

B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Full Time Curriculum and Syllabus

Third Year - Sixth Semester

B.Tech - AI&DS (R2019) – VI Semester									
COURSE CODE	**COURSE NAME**	**CATEGORY**	**L**	**T**	**P**	**C**	**MAX. MARKS**		
							CA	**ES**	**TOTAL**
Theory Courses									
1902AS601	Data and Internet Security	PC	3	0	0	3	40	60	100
1902AS602	Applied AI	PC	3	0	0	3	40	60	100
1902AS603	Deep Learning Techniques	PC	3	0	2	4	50	50	100
1903AS003	Professional Elective –II Natural Language Processing	PE	3	0	0	3	40	60	100
1903AS027	Open Elective - I - Machine Learning for Engineers	OE	3	0	0	3	40	60	100
1901HS002	HSSE-II - Intellectual Property Rights for Engineers	HSSE	3	0	0	3	40	60	100
Laboratory Courses									
1902AS651	Applied AI Laboratory	PC	0	0	2	1	60	40	100
1904AS651	Mini Project	EEC	0	0	2	1	100	-	100
1904AS652	Industrial Visit Presentation	EEC	0	0	0	1	100	-	100
Other Courses									
1904GE651	Life Skills: Aptitude II & GD	EEC	0	0	2	1	100	-	100
TOTAL			**18**	**0**	**8**	**23**	**610**	**390**	**1000**

1902AS601	DATA AND INTERNET SECURITY	L	T	P	C
		3	0	0	3

PREREQUISITE: 1902AS501 – Computer Networks

COURSE OBJECTIVES:

1.	Understand the fundamental goals, mechanisms, and challenges of data security, including identity establishment and access control.
2.	Learn cryptographic techniques for ensuring confidentiality and integrity, along with session key establishment mechanisms.
3.	Explore data security concepts for internet-based access using technologies like VPN, IPSec, and SSL.
4.	Identify common IT infrastructure threats and implement security measures such as firewalls, IPS, and IDS to safeguard systems.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Comprehend the concepts and use of cryptography to achieve the goals of security.
CO2	Analyze symmetric, asymmetric key cryptography, different attacks, vulnerabilities, and threats.
CO3	Apply encryption systems for large data using various modes of encryption.
CO4	Examine the digital signature mechanisms using the public key cryptosystems.
CO5	Evaluate the threats to a computer network and protection mechanisms including Firewall, IDS and IPS

COURSE CONTENTS:

Module-I	**Introduction to Data Security and Cryptography**	**9 Hours**

Data Security, Data Security Goals of Confidentiality, Integrity and Availability, Access Control, Attacks and threats, Chosen Plaintext Attack, Chosen Ciphertext Attacks, Symmetric Key Cryptography, Asymmetric Key Cryptography, AES, RSA, ECC, Applications of cryptography.

Module-II	**Hash functions**	**9 Hours**

One-way Hash functions: Weak and Strong one way functions, Pseudo-random Generators (PRG), True random number generators, Hash functions in random number generation, Hashing Algorithms: MD5, SHA1, SHA2, SHA3, Limitations of hashing.

Module-III	**Ciphers and Authentication**	**9 Hours**

Block Ciphers, stream ciphers, Modes of encryption: ECB, CBC, Counter mode, Message Authentication Codes (MACs), Mechanisms of symmetric ciphers: encryption and decryption, Integrity: Cryptographic checksums, HMAC, Authentication mechanism, Challenge response and Biometrics.

Module-IV	**Public Key Signature Schemes**	**9 Hours**

Formal Definitions, Signing and Verification, Public Key Signature Schemes: One way functions, One-time

Signatures, Shamir's Secret Sharing Scheme, Key exchange and Session keys, Authentication and access control mechanisms. Internet protocols: PGP, IPSEC, SSL. Public key infrastructure, X.509 certificates, Certificate revocation process and certificate revocation lists (CRLs)

Module-V	**Network Threats and Protection**	**9 Hours**

Denial of service attacks, Protection against such attacks, Firewall and protection mechanisms for unauthorized/malicious access, Intrusion detection and Intrusion prevention, Issues related to such mechanism

TOTAL: 45 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	2	1	2	-
CO2	3	3	3	2	-	-	-	-	-	-	-	2	-	3	-
CO3	3	3	3	-	-	-	-	-	-	-	2	1	2	3	-
CO4	3	3	3	3	3	-	-	-	2	2	2	3	2	3	-
CO5	3	3	2	2	1	-	-	-	2	3	1	2	1	3	2

REFERENCES:

1. William Stallings, “Cryptography and Network Security: Principles and Practice”, 7th edition, Prentice Hall.
2. Yuri Diogenes (Author), Dr. Erdal Ozkaya (Author), “Cybersecurity - Attack and DefenseStrategies: Infrastructure security with Red Team and Blue Team tactics”, Packt Publishing; 1st edition, 2018.
3. V.K. Jain, "Cryptography and Network Security", Khanna Book Publishing Company, Delhi.
4. Gupta & Gupta, "Information Security and Cyber Laws", Khanna Book Publishing Company, Delhi.
5. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Course Technology, 6th Edition.
6. Harold F. Tipton, Micki Krause Nozaki, "Information Security Management Handbook", 6th Edition, 2016.
7. Matt Bishop, "Computer Security Art and Science", Addison Wesley Reprint Edition, 2015
8. Behrouz A Forouzan, "Cryptography and Network Security", 3rd Edition, McGraw-Hill, 2015.
9. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
10. https://archive.nptel.ac.in/courses/106/106/106106129

1902AS602	APPLIED AI	L	T	P	C
		3	0	0	3

PREREQUISITE: 1902AS404 - Artificial Intelligence

COURSE OBJECTIVES:

1.	Understand AI fundamentals and core machine learning concepts, including algorithms and types of AI.
2.	Understand the applications and algorithms used in computer vision (e.g., CNNs, YOLO) and natural language processing (e.g., BERT, GPT).
3.	Investigate how AI is used in various industries, including healthcare, finance, autonomous systems, and marketing.
4.	Learn AI deployment and serving of AI models, utilizing modern frameworks, cloud platforms, and containerization technologies.
5.	Explore the ethical concerns in AI such as bias, transparency, data privacy, and responsible AI practices.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Explain AI concepts and apply machine learning algorithms, including regression, classification, and clustering, in practical scenarios.
CO2	Apply AI techniques in image classification, object detection, sentiment analysis, and machine translation.
CO3	Analyze how AI is transforming industries such as healthcare, finance, autonomous vehicles, and marketing.
CO4	Deploy AI models on platforms like AWS, Google Cloud, or Azure, utilizing frameworks such as Flask, FastAPI, and TensorFlow.
CO5	Recognize issues such as algorithmic bias, transparency, and data privacy, and use tools to ensure ethical AI practices.

COURSE CONTENTS:

Module-I	**Introduction to Applied AI**	**9 Hours**

Artificial Intelligence (AI): Definition- Differences between AI and human intelligence - Types of AI:Narrow AI, General AI, and Superintelligence - Machine Learning (ML): Definition- Types of ML: Supervised, Unsupervised, and Reinforcement Learning - ML algorithms: Regression, Classification, Clustering -Steps in ML: Data collection, preprocessing, model training, and evaluation- Deep Learning (DL): Definition- Neural Networks and their basic structure - Types of Neural Networks: CNNs , RNNs.

Module-II	**Computer Vision and NLP**	**9 Hours**

Computer Vision: Definition – Techniques: Image classification, object detection, image segmentation – Algorithms: CNNs, YOLO, RNNs - Applications: Facial recognition, Self driving cars, Medical imaging – Data Types: Images, Videos, 3D data – Natural Language Processing (NLP):Definition - Techniques: Text

Classification, Sentiment analysis , Machine translation – Algorithms: Transformers (e.g, BERT ,GPT), RNNs , Word2Vec – Application: Chatbots , Sentiment analysis ,Text translation - Data Types: Text ,Speech.

Module-III	**AI in Industry Applications**	**9 Hours**

AI in Healthcare: Diagnostics, Medical Imaging, Drug Discovery - AI in Finance: Algorithmic Trading, Fraud Detection, Risk Assessment - AI in Autonomous Systems: Self-Driving Cars, Robotics - AI in Natural Language Processing (NLP): Chatbots, Speech Recognition, Text Summarization - AI in Marketing and Retail: Recommendation Systems.

Module-IV	**AI Deployment and Serving**	**9 Hours**

Introduction to AI Model Deployment and Real-World Applications: Overview of deployment frameworks (Flask, FastAPI, Django), Basic architecture for serving AI models - Advanced Model Serving Techniques and Optimization:TensorFlow Serving, ONNX - Cloud Platforms for AI Model Deployment: AWS, Google Cloud, Microsoft Azure AI- Containerization and Orchestration for Scalable Deployments:Docker, Kubernetes

Module-V	**AI Ethics and Responsible AI**	**9 Hours**

Overview of AI Ethics:Bias in AI,Transparency and Accountability, Data Privacy- Tools and Techniques for Bias Detection and Mitigation:IBM AI Fairness 360, Fairlearn- Fairness in AI: Tools for Fairness in AI:Fairness Indicators, Fairness Constraints in Machine Learning Algorithms- Transparency and Accountability in AI: Explainable AI (XAI): LIME, SHAP- Data Privacy in AI: Tools and Techniques for Ensuring Data Privacy:Differential Privacy.

TOTAL: 45 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-

REFERENCES:

1.Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 2010
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning", 2006
3. Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", 2016
4. David A. Forsyth and Jean Ponce, "Computer Vision: A Modern Approach", 2015
5. Steven Bird, Ewan Klein, and Edward Loper, "Natural Language Processing with Python", 2009
6. Mark Coeckelbergh , "AI Ethics: A Guide for the Responsible Design and Implementation of AI Systems"
7. Martin Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", 2017
8. https://onlinecourses.nptel.ac.in/noc22_cs83/preview
9. https://nptel.ac.in/courses/106106226

1902AS603	DEEP LEARNING TECHNIQUES	L	T	P	C
		3	0	2	4

PREREQUISITE: 1902AS505 - Machine Learning

COURSE OBJECTIVES:

1.	Introduce the foundational concepts of deep learning, emphasizing its architectures, optimization methods, and ongoing research activities.
2.	Develop practical skills in implementing and testing learning algorithms using TensorFlow, focusing on CNNs and RNNs for image and sequential data tasks.
3.	Encourage the application of deep learning techniques to solve domain-specific challenges and design innovative solutions for real-world problems.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Comprehend the fundamentals of deep learning and the main research activities in this field
CO2	Interrelate architectures and optimization methods for deep neural network training
CO3	Implement, apply and test relevant learning algorithms in TensorFlow
CO4	Explore practical applications of CNNs and RNNs in diverse fields, assessing their effectiveness in handling image and sequential data tasks.
CO5	Apply deep learning techniques to solve domain-specific problems and create innovative applications across various industries

COURSE CONTENTS:

Module-I	**Introduction to Deep learning**	**9 Hours**

Introduction History of Deep Learning, McCulloch Pitts Neuron, Multilayer Perceptron's (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feed Forward Neural Networks, Back propagation

Module-II	**Activation functions and parameters**	**9Hours**

Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Parameters v/s Hyper-parameters

Module-III	**Auto-encoders & Regularization**	**9 Hours**

Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Encoder Decoder Models, Attention Mechanism, Attention over images, Batch Normalization

Module-IV	**Deep Learning Models**	**9 Hours**

Introduction to CNNs, Architecture, Convolution/pooling layers, CNN Applications, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU.

Module-V	**Deep Learning Applications**	**9 Hours**
Image Processing, Natural Language Processing, LSTMs,Speech recognition, Video Analytics		
		TOTAL: 45 HOURS

LIST OF EXPERIMENTS:

1. Summary Generation with Vanilla RNN	3 Hours
2. Stock Price Prediction	2 Hours
3. Sentiment Analysis for Movie Review DataSet	3 Hours
4. Convolutional Auto encoder	3 Hours
5. Anomaly Detection with Auto Encoder	3 Hours
6. Automatic Image Colorization	3 Hours
7. Automatic Handwriting Generation	2 Hours
8. Internet search	2 Hours
9. Image Recognition by Prediction	3 Hours
10. Earthquake Prediction	3 Hours
11. Neural Network for Brain Cancer Detection	3 Hours
	TOTAL: 30 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	3	3	-	-	-	-	-	2	2	2	2	-
CO4	3	3	3	3	3	2	-	-	-	-	2	2	3	2	-
CO5	3	3	3	3	3	2	-	-	-	-	3	1	3	3	-

REFERENCES:

1.Jason Gregory, A K Peters, "Game Engine Architecture", 3rd Edition, 2019

2. Georgios N. Yannakakis and Julian Togelius, "Artificial Intelligence and Games", January 26, 2018, Springer

3. Ian Goodfellow, YoshuaBengio, Aaron Courville. "Deep Learning", MIT press, 2016

4..https://www.google.com/url?q=https://nptel.ac.in/courses/106105215&sa=D&source=editors&ust=1737711220976334&usg=AOvVaw1Sr46B5IEAm-ojT3nHT-YG

5. https://www.coursera.org/specializations/deep-learning

6.https://onlinecourses.nptel.ac.in/noc21_cs76/preview

1903AS003	NATURAL LANGUAGE PROCESSING	L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES:

1.	To learn the basics of natural language processing and understand various steps in it.
2.	To introduce the fundamentals of language processing from the algorithmic viewpoint.
3.	To discuss various issues that makes natural language processing a hard task.
4.	To discuss some well-known applications of natural language processing

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Infer the foundational NLP algorithms such as tokenization, word normalization, and Naive Bayes classification to solve text processing and classification problems.
CO2	Analyze semantic structures using techniques like TF-IDF, PMI, and vector models to evaluate and represent meaning in text data
CO3	Examine advanced NLP models using RNNs, LSTMs, and Transformers to address tasks such as language modeling and sequence-to-sequence applications.
CO4	Assess linguistic structures through methods like sequence labeling, dependency parsing, and context-free grammars to assess syntactic and semantic relationships.
CO5	Explore practical NLP solutions by integrating machine learning techniques for applications like chatbots, machine translation, and speech processing.

COURSE CONTENTS:

Module-I	**Introduction**	**9 Hours**

Introduction - Regular Expressions, Tokenization, Edit Distance - Word Normalization, Lemmatization and Stemming - Minimum Edit Distance - N-Grams - Smoothing, Interpolation, and Backoff - Advanced: Perplexity's Relation to Entropy.

Module-II	**Semantic Analysis**	**9 Hours**

Lexical Semantics - Vector Semantics - TF-IDF: Weighing terms in the vector - Pointwise Mutual Information (PMI) - Applications of the TF-IDF or PPMI vector models - Evaluating Vector Models-Semantic Role Labeling - Semantic Roles - Diathesis Alternations - Semantic Roles: Problems with Thematic Roles - The Proposition Bank - FrameNet - Semantic Role Labeling.

Module-III	**RNNs and LSTMs**	**9 Hours**

Recurrent Neural Networks - RNNs as Language Models - RNNs for other NLP tasks -Stacked and Bidirectional RNN architectures -The LSTM - Common RNN NLP Architectures - The Encoder-Decoder Model with RNNs - The Transformer- Transformer Blocks - Parallelizing computation using a single matrix X - The input: embeddings for token and position - The Language Modeling Head.

Module-IV	**Annotating Linguistic Structure**	**9 Hours**

Sequence Labeling for Parts of Speech and Named Entities - Part-of-Speech Tagging - Conditional Random Fields (CRFs) - Evaluation of Named Entity Recognition - Context-Free Grammars and Constituency Parsing – Ambiguity - CKY Parsing - Dependency Parsing Transition-Based Dependency Parsing - Graph-Based Dependency Parsing – Evaluation.

Module-V	**NLP Applications**	**9 Hours**

NLP Applications -Machine Translation - Question Answering, Information Retrieval, and RAG- Automatic Speech Recognition and Text-to-Speech- Chatbots& Dialogue Systems.

TOTAL: 45 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	-	-	-	-	-	-	2	1	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	1	-
CO4	3	2	2	2	3	-	-	-	-	-	-	-	2	2	-
CO5	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-

REFERENCES:

1.Jurafsky , James H. Martin “Speech & language processing”, Pearson publications
2. Allen, James, "Natural language understanding", Pearson, 1995.
3. Pierre M. Nugues, “An Introduction to Language Processing with Perl and Prolog” , Springer
4. King, M., "Parsing Natural Languages", New York: Academic Press, 1998
5. Ritchie, D. et al., "Computational Morphology", England: MIT, 1992
6. Richard, S. "Morphology and Computation", Cambridge: MA: MIT Press. 1992
7. Simon Garrod and Martin J., "Pickering Issues in Language Processing, in Language"
8. https://archive.nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs56
9. https://archive.nptel.ac.in/courses/106/101/106101007

1903AS027	MACHINE LEARNING FOR ENGINEERS	L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES:

1.	Gain a solid foundation in the core principles, techniques, and algorithms used in machine learning
2.	Understand the differences between supervised, unsupervised, and reinforcement learning and their applications.
3.	Develop skills to handle, clean, preprocess, and explore datasets for machine learning applications.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Explain the fundamental concepts of machine learning including different learning paradigms, data handling techniques and dataset partitioning methods, enabling them to prepare data for machine learning tasks.
CO2	Classify various machine learning approaches and describe the general processes involved in a typical machine learning application.
CO3	Apply supervised learning algorithms (KNN, Linear/Logistic Regression, SVM) to solve classification and regression problems, evaluate model performance using appropriate metrics and interpret the results in the context of a give case study.
CO4	Implement and analyze different clustering techniques to discover patterns in unlabeled data and interpret the clusters formed in a given case study.
CO5	Explain the principles of Gaussian Mixture Models and the relevance in advanced AI/ML applications like Deep Learning, Natural Language Processing, Computer Vision and Generative AI.

COURSE CONTENTS:

Module-I	**Introduction to Machine Learning**	**9 Hours**

Describe concept of machine learning, Understanding Learning in Machine Learning- Learn Networks - handle dataset and its Feature Sets - Dataset division: test, train and validation sets, cross validation.

Module-II	**Basics of Machine Learning**	**9Hours**

Applications of Machine Learning - processes involved in Machine Learning - Introduction to Machine Learning Techniques: Supervised Learning- Unsupervised Learning and -ReinforcementLearning.

Module-III	**Supervised Learning with case study**	**9 Hours**

Classification and Regression - K-Nearest Neighbor with case study - Linear Regression -Logistic Regression, Support Vector Machine (SVM) with case study, Evaluation Measures: SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve.

Module-IV	**Unsupervised Learning with case study**	**9 Hours**
Unsupervised learning with case study- Introduction to clustering, Types of Clustering: Hierarchical, Agglomerative Clustering and Divisive clustering; Partitional Clustering with case study-K-means clustering with case study.		
Module-V	**Gaussian Mixture Models for AI and ML Applications**	**9 Hours**
Gaussian Mixture Models- Deep Learning, Natural Language Processing, Computer Vision, Generative AI.		
		TOTAL: 45 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	3	3	-	-	-	-	-	2	2	2	2	-
CO4	3	3	3	3	3	2	-	-	-	-	2	2	3	2	-
CO5	3	3	3	3	3	2	-	-	-	-	3	1	3	3	-

REFERENCES:

1. Jeeva Jose, "Introduction to Machine Learning", Khanna Book Publishing Co., 2020
2. John Paul Mueller and Luca Massaron, "Machine Learning for Dummies", 2016
3. Rajeev Chopra and Khanna, "MachineLearning", 2021
4. Introduction to Machine Learning - Course https://onlinecourses.nptel.ac.in/noc25_cs47/preview
5. https://www.coursera.org/specializations/ Machine Learning

1901HS002	INTELLECTUAL PROPERTY RIGHTS FOR ENGINEERS	L	T	P	C
		3	0	0	3

PREREQUISITE:

The course assumes no prior skill or background in design, art or engineering. This course covers the fundamental aspects of intellectual property (IP): copyright and related rights, trademarks, patents, geographical indications, and industrial designs. It also covers contemporary issues impacting the IP field such as: new plant varieties, unfair competition, enforcement of IP rights and emerging issues in IP.

COURSE OBJECTIVES:

1.	A foundation in the basic concepts of IP
2.	Better understanding of the relationship between IP and other policy areas such as health, climate change, traditional knowledge and emerging technologies
3.	Practical learning experience in technology transfer and IP license negotiations
4.	Experience of learning from renowned experts in a multicultural environment and joining an alumni of students sharing a similar interest in IP
5.	The chance to identify areas for further IP study

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Explain various types of IPRs specific to Engineering
CO2	Explain concepts such as Copyrights, Trademarks, GIs and Industrial designs
CO3	Explain basic concepts of Engineering Patents
CO4	Explain concept of Patent Search and various methods to do it
CO5	Develop a sample PCT Application and explain examination procedures

COURSE CONTENTS:

Module-I	**Introduction**	**9 Hours**

Overview of IP, Copyright, Trademarks, Geographical Indicators, Industrial Designs, Patents, Unfair competition, Enforcement of IP Rights, Emerging Issues in IP & IP Management

Module-II	**Copyrights & Trademarks**	**6 Hours**

The concept, Case Study, Historical background, Principles, Notion of Work, Rights and Limitations, Formats & Filing Procedures

Module-III	**Geographical Indicators & Industrial Designs**	**6 Hours**

The concept, Case Study, Historical background, Principles, Notion of Work, Rights and Limitations, Formats & Filing Procedures

Module-IV	**Patents**	**15 Hours**

The Macro-Economic Impact of the Patent System, The Patent Application Process, The Different Layers of the International Patent System and Regional Patent Protection Mechanisms, Kinds of Intellectual Property Protection Based on Types of Inventions, Legal Issues of the Patenting Process, Enforcement, New Issues, Important Cases and Discussions, IP and Development - Flexibilities and Public Domain under Patents, Patent Search

Module-V	**Patent Cooperation Treaty**	**9 Hours**

PCT and its Uses, Preparing a PCT Application, PCT Services, Patent Agent and Common Representatives, International Search, International Examination

TOTAL: 45 HOURS

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	1	1	1	-	1	-	-	-	-	1
CO2	1	-	-	2	-	1	1	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	1	-	-	2	-	1	1	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	1	1	1	-	1	-	-	-	-	1

REFERENCES:

1.Pandey Neeraj and Dharni Khushdeep, "Intellectual Property Rights", 2014

2.Ramakrishna B and Anil Kumar HS, "Fundamentals of IPR: for students, Industrialist and patent lawyers", 2017

3. Dr MK Bandarai, "Law relating to IPR", Central Law Publication, 2014

4. H.S. Chawla, "Introduction to Intellectual Property Rights", Oxfors& IBH Publishing, 2020

5. JP Mishra, "Introduction to IPR", Central Law Publications

6. https://patents.google.com - Introduction to IPR books

1902AS651	APPLIED AI LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE: 1902AS404 - Artificial Intelligence

COURSE OBJECTIVES:

1.	Acquire, clean, and preprocess various datasets while extracting relevant features for model development.
2.	Develop machine learning models to perform tasks like speech recognition, clustering, image classification, and sentiment analysis.
3.	Tune and optimize models to improve accuracy through techniques like hyperparameter adjustments and data augmentation.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

CO1	Develop skills to acquire, clean, and pre-process datasets from various domains, preparing them for model development.
CO2	Infer experience in extracting features from datasets and building machine learning models for tasks like speech recognition and classification.
CO3	Explore techniques to optimize and fine-tune machine learning models to improve accuracy and performance.
CO4	Experiment with diverse datasets (speech, graph, image, document) and develop tailored models for each type.
CO5	Evaluate model performance and apply methods like hyperparameter tuning and data augmentation to enhance results.

LIST OF EXPERIMENTS:

1. Acquire, clean and pre-process a speech recognition dataset, compute features and develop models to recognize words.	4 Hours
2. Compute features and develop models to recognize words a speech recognition and its Improve accuracy	4 Hours

3. Acquire, clean and pre-process a graph dataset, compute features and develop models to identify clusters/communities	4 Hours
4. Compute features and develop models to identify clusters/communities a graph and its improve accuracy	3 Hours
5. Acquire, clean and pre-process an image dataset(s), compute features and develop models to identify various classes such as hand-written numerals or characters, objects etc.	3 Hours
6. Compute features and develop models to identify various classes such as hand-written numerals or characters, objects an image dataset(s) and its improve accuracy	4 Hours
7. Acquire, clean and pre-process document dataset, compute features and develop models for sentiment analysis	4 Hours
8. Compute features and develop models for sentiment analysis a document dataset and its improve accuracy.	4 Hours
TOTAL: 30 HOURS	

COs Vs POs & PSOs MAPPING:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	3	-	-	-	1	2	2	3	3	3	-
CO2	2	3	3	3	3	-	-	-	1	2	2	3	3	3	-
CO3	2	3	3	2	3	-	-	-	2	2	2	3	3	3	-
CO4	2	3	3	3	3	-	-	-	2	2	2	3	3	3	-
CO5	2	3	3	3	3	-	-	-	2	2	2	3	3	3	-

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