An Autonomous Programme Structure of
M. Tech. Electronics and Telecommunication Engineering
Specialization: Artificial Intelligence
(AY: 2020-2021 Onwards)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Teaching Scheme Hours/Week</th>
<th>Examination Scheme</th>
<th>Marks</th>
<th>Credit</th>
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| Grand Total | 23 575 575 20                       |

20PEECAI 01 Programme Elective I:

1. Digital Image Processing
2. Soft Computing
### M. Tech. E & TC –AI : Second Semester

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<tr>
<th>Course Code</th>
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<th>Teaching Scheme Hours /Week</th>
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20PEECAI 02 Programme Elective II:

1. Computer Vision
2. Virtual Reality

*Audit Course:

1. Soft Skills and Business Communications
2. Entrepreneurship Development

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**DEAN ACADEMICS**
MKSSS's Cummins College of Engineering for Women
Karvenagar, Pune-411052

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**APPROVED BY**
Governing Body Members
MKSSS's Cummins College of Engineering
For Women Karvenagar, Pune 411052.
### M. Tech. E & TC – AI: Third Semester

<table>
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**20OEHS Elective I: NPTEL Online Courses under Humanity and Sciences approved by the Department (ISE and ESE will be conducted by the college) pertaining to the following domains**

1. Ethics
2. Patent Law, Entrepreneurship
3. Foreign Language

**20PEECAI 03 Programme Elective III: Online Courses**

1. Reinforcement Learning
2. Applications of Artificial Intelligence

### M. Tech. E & TC – AI: Fourth Semester

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20ECAI 01: Mathematics for Artificial Intelligence

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hrs/Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 4

Course Objectives:
1. To interpret the types and operations on matrices and various methods of solving systems of linear equations
2. To recognize the concepts of vector space, linear independence, basis, dimension and its applications
3. To explore probability to analyze and test data
4. To explore statistical methods to analyze and test data
5. To learn multivariate calculus

Course Outcomes:
After completion of the course, students will be able to
1. Determine and analyze transformations of matrices and apply multiple methods to solve the systems of linear equations
2. Apply and analyze the concepts of vector space and subspace
3. Apply probability and Statistical methods for Data Analysis
4. Apply multivariate calculus to solve given problems

Unit I: Linear Algebra
Scalars, Vectors, Matrices and Tensors, Rank of a matrix, use of echelon form and canonical form of a matrix to find rank, Inverse matrix to solve system of linear equations, Types of Matrices, classification of real and complex matrices, trace, quadratic form, Lower-Upper decomposition (LDU).

Unit II: Vector Spaces
Vector Space, vector sub-space, basis and dimension, Linear dependence and independence of vectors, orthogonality, Orthogonal Projections, Gram-Schmidt orthogonalization Procedure, Eigen values and Eigen vectors, Principal Component Analysis (PCA), Singular Value Decomposition (SVD).
Probability, conditional probability, marginal probability, Bayes’ theorem, Maximum Likelihood Estimation (MLE), Maximum A Posteriori estimation (MAP), Random variables, variance, expectation, Probability density function, histogram, Cumulative distribution function, standard probability density functions, probability distributions.

Unit IV: Multivariate Calculus

Differential and Integral Calculus, Partial Differentiation, chain rule, Vector-Values Functions, Gradient, Jacobian and Hessian approach.

Reference Books:

20ECAI 02 Optimization Techniques

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 4

Course Objectives:
1. To understand the basics of optimization techniques and problem formulation for optimization
2. To understand one-dimensional Optimization Algorithms
3. To understand solution techniques for unconstrained optimization problems with multiple variables
4. To understand linear programming to perform optimization
5. To understand Guided Random Search Methods and it’s solution techniques based on random searches in locating the optima

Course Outcomes:
After completion of the course, students will be able to
1. Interpret the necessary and sufficient condition for optimization
2. Formulate the optimization problem
3. Solve optimization problems for various applications
4. Analyze solutions for optimization problems

UNIT I: Introduction
Optimization Problem, Modeling of the Optimization Problem, Solution with the Graphical Method, Convexity, Gradient Vector, Directional Derivative, Hessian Matrix, Linear and Quadratic Approximations.

UNIT II: 1-D Optimization Algorithms

UNIT III: Unconstrained Optimization

UNIT IV: Linear Programming
Introduction, Solution with the Graphical Method, Standard Form of an LPP, Basic Solution,
UNIT V: Guided Random Search Methods


Reference Books:


20ECAI 03 Fundamentals of Artificial Intelligence

Teaching Scheme
Lectures: 3 Hrs / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objective:
1. To explain the basics of Artificial Intelligence (AI)
2. To introduce various types of algorithms useful in AI
3. To explain the concepts of machine learning, pattern recognition and their applications in the field of AI
4. To explain the code of ethics for AI

Course Outcomes:
After completion of the course, students will be able to
1. Explain the components of intelligent agents and expert systems
2. Apply knowledge representation techniques and problem solving strategies to AI applications
3. Explain and analyze the search and learning algorithms
4. Describe the code of ethics for the AI systems

Unit I: Basics of AI
Categories of AI, applications of AI, intelligent agents, agents and environments, good behavior, the nature of environments, structure of agents.

Unit II: Problem Solving and Constraint Satisfaction Problems
Problem solving agents, searching for solutions, uninformed search strategies, Informed search strategies, heuristic function, local search algorithms and optimistic problems, optimal decisions in games, Alpha-Beta Pruning, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP.

Unit III: Knowledge Representation
Logic, Propositional logic, First order logic, Knowledge engineering in first order logic, inference in first order logic, prepositional versus first order logic, forward chaining, backward chaining, resolution, knowledge representation, uncertainty and methods, Bayesian probability and belief network, probabilistic reasoning, Bayesian networks, inferences in Bayesian networks.
Unit IV: Learning

Learning from observations: forms of learning, Inductive learning, Learning decision trees, Ensemble learning, Knowledge in learning, Logical formulation of learning, Explanation based learning, Learning using relevant information, Statistical learning methods, Learning with hidden variable, EM algorithm, Neural networks

Unit V: Expert Systems

Introduction to Expert System, Architecture and functionality, Examples of Expert system, Basic steps of pattern recognition system, Feature Extraction- Principal Component Analysis, Linear Discriminant Analysis, Object Recognition- Template Matching theory, Prototype Matching Theory, Pattern Mining.

Unit VI: Code of Ethics for AI


Reference Books:
6. NPTEL Lectures on AI: http://nptel.ac.in/courses/106105077/
20ECAI 04 Machine Learning

Teaching Scheme:
Lectures: 3 Hrs./Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To learn machine learning paradigms used for regression and classification
2. To analyze various machine learning algorithms
3. To use software tools for implementation of machine learning algorithms

Course Outcomes:
After completion of the course, students will be able to

1. Make use of the software tools to process data
2. Apply suitable data pre-processing and data visualization method to interpret data and select suitable features
3. Compare and contrast different supervised and unsupervised machine learning techniques with their advantages and limitations
4. Select a suitable classifier to build classification and recognition system
5. Apply various dimensionality reduction methods to extract important features from the input data
6. Analyze various machine learning techniques and design models for prediction, classification and clustering problems

Unit I: Foundations of Machine Learning


Unit II: Data Interpretation

Machine learning pipeline, Feature Engineering for ML, Data types- numerical and categorical, Data wrangling- filtering, pre-processing, typecasting, transformation, feature selection, Data visualization- Descriptive statistics, Frequency tables, Creating graphs, Data analysis- Univariate and Bivariate analysis, Statistical methods- Central tendencies and variance, Boxplot, Outliers.
Unit III: Supervised Learning

Two-class and Multiclass learning problems, Regression- linear and logistic, Model selection and generalization, Outlier detection, Cross Validation, Classification, K-Nearest Neighbour algorithm, Support Vector Machines, Decision trees, Random Forests, Naïve Bayes classifier, Neural Networks, Applications of ML in Classification.

Unit IV: Unsupervised Learning

Dimensionality reduction- Principal Component Analysis (PCA), Independent Component Analysis (ICA), Singular Value Decomposition (SVD), Clustering: k-Means, Mean-shift, Hierarchical Clustering, Expectation–Maximization (EM), Gaussian Mixture Models (GMM), Applications of ML in Clustering, Predictive analysis.

Reference Books:

20PEECAI 01 Digital Image Processing

Teaching Scheme:
Lectures: 3 Hrs /Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To understand image fundamentals and mathematical operations performed on images
2. To learn image enhancement techniques
3. To understand different image segmentation techniques
4. To study image Representation and Description techniques
5. To study applications of image processing and AI applications of Image Processing

Course Outcomes:
After completion of the course, students will be able to
1. Describe image processing fundamentals and implement basic mathematical operations on digital images
2. Apply image enhancement techniques in spatial and frequency domain
3. Implement segmentation techniques
4. Implement and analyze feature extraction and feature description techniques
5. Apply image processing and AI techniques to develop different applications

Unit I: Digital Image Fundamentals
(03)
Elements of visual perception, Human Visual system, Image sensing and acquisition, image sampling and quantization, Basic relationship between pixels, neighbours of a pixel, Types of images, Color models – RGB, CMY, YIQ, HSI, Statistical parameters.

Unit II: Image Enhancement
(04)

Unit III: Image Segmentation
(10)
Thresholding, histogram based segmentation, Edge based segmentation, Clustering, Region growing, region splitting, watershed algorithm.
Unit IV: Image Feature Detectors and Descriptors
Corner detectors, blob detector, SIFT, HOG, GLCM.

Unit V: Applications of Image Processing
Face detection using Viola Jones algorithm, QR code recognition, Applications of AI in Image restoration, photo editing, old image colouring.

Reference Books:
Teaching Scheme:  
Lectures: 3 Hrs/Week

Examination Scheme:  
In-Semester: 50 Marks  
End-Semester: 50 Marks  
Credits: 3

Course Objectives:  
1. To explain the concept of biological neuron and artificial neuron model  
2. To introduce the soft computing technique namely, artificial neural networks and fuzzy logic  
3. To explain the areas of application of soft computing techniques  
4. To explain the alternative solutions to the conventional problem-solving techniques in the image/signal processing, pattern recognition/classification, control system

Course Outcomes:  
After completion of the course, students will be able to  
1. Explain the concepts of Artificial Neural Networks and its application for classification and regression  
2. Describe the concepts of fuzzy logic and fuzzy inference system  
3. Explain and analyze fuzzy control system  
4. Apply soft computing techniques to solve real world problems

Unit I: Artificial Neural Network  

Unit II: Fundamentals of Fuzzy Logic  
Unit III: Fuzzy Control System

Control System Surface, Assumptions in Fuzzy control system design, Fuzzy controllers and comparison with traditional PID controllers, Advantages of Fuzzy Logic Controller (FLC), Architecture of FLC: Mamdani type.

Unit IV: Adaptive Neuro-Fuzzy Inference Systems (ANFIS)

ANFIS Architecture, Hybrid learning Algorithm, Advantages and Limitations of ANFIS, Applications of ANFIS for regression.

Reference Books:

Unit IV: Applications of Natural Language Processing


Reference Books:


20ECAI 05 Natural Language Processing

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To understand various aspects of Natural Language Processing
2. To learn Phonological, Morphological, Syntactic and Semantic processing
3. To understand issues related to ambiguity of Natural Language
4. To understand the advanced applications of Natural Language Processing

Course Outcomes:
After completion of the course, students will be able to
1. Explain the importance of Natural Language Processing
2. Identify the fundamental concepts and techniques of Natural Language Processing
3. Analyze ambiguous structure of Natural Language
4. Summarize the advanced applications of Natural Language Processing

Unit I: Introduction to Natural Language Processing  Fundamentals of Phonetics  (09)
The Study of Language, Evaluating language Understanding Systems, Different levels of Language Analysis, Speech Sounds and Phonetic Transcription, Articulatory Phonetics, Phonological Categories and Pronunciation Variation, Phonetic Features

Unit II: Fundamentals of Syntax  (09)

Unit III: Fundamentals of Semantics and Discourse  (10)
20ECAI 06 Data Analytics

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To understand the concepts, challenges and techniques of Big Data and Big Data Analytics
2. To introduce the concepts of Hadoop, Map Reduce framework and ‘R’ for Big Data Analytics
3. To teach students to apply skills and tools to manage and analyze Big Data

Course Outcomes:
After completion of the course, students will be able to
1. Design and manage a Big Data application using Hadoop technology framework
2. Collect, manage, store, query and analyze various forms of Big Data using Map-Reduce and other Big Data tools
3. Apply Big Data Analytics tools for business decisions and strategy definition
4. Implement solutions to some of the open Big Data problems using R
5. Compare various Data Analytic Methods and trends

UNIT I: Introduction
Database Management Systems, structured data, SQL, Big data overview, characteristics of Big Data, applications of Big Data, Unstructured data, NOSQL, advantages of NOSQL, Comparative study of SQL and NOSQL.

UNIT II: Big Data Architecture, Hadoop
Challenges enabling real time big data processing, Hadoop – Introduction, building blocks of hadoop, Installing and configuring Hadoop.

UNIT III: MapReduce Fundamentals
Components of Hadoop, HBASE, HIVE, Map Reduce Working, the Mapper and Reducer, InputFormats and OutputFormats, Introduction to HBASE, Sqoop, Spark.

UNIT IV: Big Data Analytics
Data Analytical architecture, drivers of Big Data, Emerging Big Data Ecosystem and new approach, Data Analytic Life Cycle: Discovery, Data preparation, Model planning, Model Building, Communicate results, Operationalize, Case Study: Global Innovation Network
And Analysis (GINA).

UNIT V: Analytics using R
R Fundamentals: Math, variables, strings, vectors, factors, vector operations, Data structures in R: Arrays and amp, Matrices, lists, data frames, R programming fundamentals: Conditions and loops, functions in R, Objects and Classes, Working with data in R: Reading CSV and Excel files, reading text files, writing and saving data objects to file in R.

UNIT VI: Data Analytic Methods and Trends
Statistical Methods, Machine learning methods – supervised, unsupervised, recommendation systems, Big data visualization, Open source Tools / Techniques / Languages (R, Python).

Reference Books:
20ECAI 07 Artificial Intelligence in Wireless Communications

Teaching Scheme:
Lectures: 3 Hrs/Week

Course Objectives:
1. To understand the cognitive radio systems in wireless communication
2. To understand artificial intelligence techniques applied in wireless communications
3. To understand functions of the software defined radio
4. To understand multi-objective optimization of Radio Resources

Course Outcomes:
After completion of the course, students will be able to
1. Describe Cognitive radio architecture, Cognitive engine design and its components
2. Discuss artificial intelligence techniques applied in Wireless Communications
3. Interpret basics of Software Defined Radio
4. Discuss Multi-objective Optimization of Radio Resources
5. Analyze an algorithm to perform the multi-objective analysis

UNIT I: Overview of Cognitive Radio and the Cognitive Engine
(07)

UNIT II: Artificial Intelligence in Wireless Communications
(07)
Artificial Intelligence Techniques- Neural Networks, Hidden Markov Models (HMM), Fuzzy Logic, Evolutionary Algorithms.

UNIT III: Overview and Basics of Software Defined Radios (SDR)
(07)
UNIT IV: Optimization of Radio Resources

Objective Space, Multi-objective Optimization: Objective Functions, Bit Error Rate (BER), Bandwidth, Spectral Efficiency, Interference, Signal to Interference Plus Noise Ratio (SINR), Throughput, Power, Computational Complexity. Multi-objective Optimization: A Different Perspective, Multi-objective Analysis- Utility Functions, Population-Based Analysis.

UNIT V: Genetic Algorithms for Radio Optimization


References Books:
20ECAI 08 Deep Learning

Teaching Scheme:
Lectures: 3 Hrs./Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To learn basics of neural networks and deep learning
2. To understand training of deep neural networks and L-layers
3. To introduce various CNN architectures and transfer learning

Course Outcomes:
After completion of the course, students will be able to
1. Describe concepts of neural networks and apply modern software tools and libraries
2. Build and train L-layer deep neural network
3. Make use of hyper-parameter tuning and regularization methods for optimized model performance
4. Design a convolutional neural network for image recognition and classification applications
5. Apply transfer learning to train deep neural network for real-world applications
6. Analyze the models using various performance metrics

Unit I: Introduction to Deep Learning

Unit II: Tuning Deep Networks

Unit III: Convolutional Neural Network
Convolutional Neural Network (CNN) architecture, Building blocks of CNN, Convolution
operation and layer, Kernels and Filters, Pooling layer, Stacking of layers, Vanishing/Exploding Gradients, Training of CNN, Accuracy and loss, Cross-validation, Performance metrics, Image classification examples using Deep Convolutional Neural Network.

Unit IV: Transfer Learning and Applications of Deep Learning

Reference Books:
20ECAI 09 Research Methodology

Teaching Scheme:
Tutorial: 1 Hr /Week

Examination Scheme:
In-Semester: 25Marks
Credits: 1

Course Objectives:
1. To understand basic concepts of research and research methodology
2. To understand principles behind Research Problem formulation
3. To study Instrumentation schemes for Data collection
4. To prepare a research/ project proposal

Course Outcomes:
After completion of the course, students will be able to
1. Formulate Research Problems
2. Design and Analyze schemes for Data collection
3. Write research proposals
4. Write Technical Papers

Unit I: Research Problem
Research and research problem, sources of research problem, criteria / Characteristics of a good research problem, Literature Review, Scope and objectives of research problem, Hypothesis its importance and construction, Selecting a sample.

Unit II: Data Collection Design
Data Collection, Form design and Data processing.

Unit III: Research Proposal

Reference Books:
20PEECAI 02 Computer Vision

Teaching Scheme:
Lectures: 3 Hrs./Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To understand computer vision fundamentals and applications
2. To understand feature detection, matching and image recognition applications
3. To learn image segmentation, motion estimation, activity recognition tasks

Course Outcomes:
After completion of the course, students will be able to-
1. Describe the computer vision system and its applications
2. Identify image features and apply feature detection and matching methods
3. Detect objects and pedestrian for autonomous vehicles
4. Apply image segmentation techniques for medical imaging applications
5. Apply motion estimation algorithms to detect and track motion in video
6. Build a computer vision system for gesture recognition

Unit I: Computer Vision for Autonomous vehicles
Self-Driving cars, Advanced Driver Assistant System- Tasks and Challenges, Case study- Lane detection, Pedestrian detection from the road scene.

Unit II: Computer Vision for Disease Diagnosis
Medical imaging- X-ray, CT and MRI; Case study- Medical image segmentation for Tumour detection, Tumour classification as cancerous or non-cancerous.

Unit III: Computer Vision for Video Surveillance
Surveillance and vision based tasks, Foreground-Background Separation, Background Subtraction and Modelling, Motion tracking- Optical Flow. Case study- Human activity recognition.

Unit IV: Computer Vision for Gesture Recognition
Human Computer Interaction (HCI), Hand gestures, Detection- color and shape features, Tracking, feature matching, Gesture Recognition system using Convolutional Neural Networks.
Reference Books:
20PEECAI 02 Virtual Reality

**Teaching Scheme:**
Lectures: 3 Hrs./Week

**Examination Scheme:**
In-Semester: **50** Marks
End-Semester: **50** Marks
Credits: **3**

**Course Objectives:**
1. To understand fundamental concepts and components of Virtual Reality
2. To study the input-output interface in Virtual Reality
3. To study visual computation in Virtual Reality
4. To understand Environment Modeling and interactive techniques
5. To study the system structure of Augmented Reality

**Course Outcomes:**
After completion of the course, students will be able to
1. Explain perceptual concepts governing virtual reality
2. Identify and solve the issues of various virtual reality frameworks
3. Design immersive experience using virtual reality Software

**Unit I: Introduction of Virtual Reality (VR)**
Fundamental Concept and Components of Virtual Reality, Primary Features and Present Development on Virtual Reality.

**Unit II: Multiple Modals of Input and Output Interface in Virtual Reality**
Input - Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus and 3D Scanner, Output - Visual / Auditory / Haptic Devices.

**Unit III: Visual Computation in Virtual Reality**

**Unit IV: Environment Modeling and Interactive Techniques in Virtual Reality**
Unit V: Introduction of Augmented Reality
System Structure of Augmented Reality (AR), Key Technology in AR.

Unit VI: Application of VR in Digital Entertainment
VR Technology in Film and TV Production, VR Technology in Physical Exercises and Games.

Reference Books:
20AC 01 Soft Skills and Business Communication

Teaching Scheme:
Practical: 2 Hrs/Week

Examination Scheme:
In-Semester: Nil
End-Semester: Nil
Credits: Nil

Course Objectives:
1. To develop team spirit, leadership and professionalism.
2. To focus on overall personality development.
3. To develop right attitudinal and behavioral aspects, and build the same through activities.
4. Possess right professional and social ethical values.
5. To make student confident in communicating in Business environment.
6. Improve their fluency in English language.

Course Outcomes:
After completion of the course, students will be able to
1. Communicate, interact and present his ideas to other professionals.
2. Explain role and contents of soft skills through instructions, knowledge acquisition, demonstration and practice.
3. Develop right attitudinal and behavioral aspects, and build the same through activities.
4. Develop right professional and social ethical values.
5. Overcome apprehension of communicating in professional environment.
6. Language proficiency will enable student to present ideas, applications and reports effectively in oral and written communication.

Unit I: Self-Awareness & self-Development

a) Self Assessment, Self Appraisal, SWOT, Goal setting - Personal & career- Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting.

b) Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, prioritization.
Unit II: Communication Skill

a) Importance of communication, types, barriers of communication, effective communication.
b) Speaking Skills- Public Speaking, Presentation skills, Group discussion- Importance of speaking effectively, speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self-expression, body language phonetics and spoken English, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques.
c) Listening Skills: Law of nature- you have 2 ears and 1 tongue so listen twice and speak once is the best policy, Empathic listening, Avoid selective listening.
d) Group Discussion- characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency.
e) Presentation skills- planning, preparation, organization, delivery.

Unit III: Corporate/ Business Etiquettes.

Corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social & office setting- Understand the importance of professional behavior at the workplace, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Body language, Meeting etiquettes (targeted at young professionals who are just entering business environment), Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities.

Unit IV: Interpersonal relationship

Team work, Team effectiveness, Group discussion, Decision making - Team Communication Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity.

Unit V: Leadership skills

Leaders’ role, responsibilities and skill required- Understanding good Leadership behaviours, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions,
Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback.

Unit VI: Other skill

a) Time management-The Time management matrix, apply the Pareto Principle (80/20Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions, to maximize your personal effectiveness, how to say “no” to time wasters, develop your own individual plan of action.
b) Stress management- understanding the stress & its impact, techniques of handling stress

c) Problem solving skill, Confidence building Problem solving skill, Confidence building.

Reference Books:

20AC 01 Entrepreneurship Development

Teaching Scheme:
Practical: 2 Hrs/Week

Examination Scheme:
In-Semester: Nil
End-Semester: Nil
Credits: Nil

Course Objectives:
1. Understand the fit between individual entrepreneurial ambitions
2. Select a problem worth solving
3. Identify the customers
4. Develop a solution for your customers' problems and problem solution
5. Build and demonstrate an MVP (Minimum Viable product)
6. Structure a business model around the problem, customer, and solution and present Business Model Canvas

Course Outcomes:
After completion of the course, students will be able to
1. Explain what it takes to be an entrepreneur
2. Analyze business opportunities and the basics to create, launch and manage new businesses
3. Develop Business Model for their Idea/Problem
4. Create MVP (Minimum Viable Product)

Unit I: Introduction to Entrepreneurship development
Discover yourself, Principles of Effectuation, Identify your entrepreneurial style.

Unit II: Problem Identification and Idea generation
Identify Problems worth Solving, Introduction to Design Thinking, Generate ideas that are potential solutions to the problem identified.

Unit III: Customer Segmentation
Customer identification, Market, Creative solution, Unique Value proposition.

Unit IV: Business Model Canvas
Types of business models, Business Plan documentation, Risk identification.
Unit V: Validation
Identification of MVP, Solution development, Building products/services, Build-measure-learn loop for development, Market fit of solution.

Reference Books:
6. The Lean BMC: https://www.youtube.com/watch?v=FjB_e7UQ1hc
20PEECAI 03 Reinforcement Learning

Teaching Scheme
Lectures: 3 Hrs / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objective:
1. To explain Reinforcement Learning tasks, principles and value functions
2. To introduce to the tabular methods to solve classical control problems
3. To explain the policy gradient methods
4. To explain the current advanced techniques and applications in Reinforcement Learning

Course Outcomes:
After completion of the course, the student will be able to
1. Explain the principles of Reinforcement Learning
2. Apply tabular methods to solve control problems
3. Explain and analyze deep Q-network based algorithms
4. Describe the applications of Reinforcement Learning

Unit I: Basics of Reinforcement Learning (RL) (08)

Unit II: Tabular Methods and Q-networks (08)
Planning through the use of Dynamic Programming and Monte Carlo, Temporal-Difference learning methods (TD(0), SARSA, Q-Learning), Deep Q-networks (DQN, DDQN, Dueling DQN, Prioritized Experience Replay).

Unit III: Policy Optimization (08)
Introduction to policy-based methods, Vanilla Policy Gradient, Reinforce Algorithm and stochastic policy search, Actor-critic methods, Advanced policy gradient, Model based RL.

Unit IV: Model-based RL and Applications (12)
Reference Books:
5. https://www.davidsilver.uk/teaching/
20PEECAI 03 Applications of Artificial Intelligence

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
In-Semester: 50Marks
End-Semester: 50 Marks
Credits: 3

Course Objectives:
1. To explain the machine learning techniques for disease diagnosis and clinical decision support system
2. To explain the concepts of machine learning applied to cyber security
3. To explain the concepts of machine learning applied to the field of robotics

Course Outcomes:
After completion of the course, students will be able to
1. Describe the machine learning techniques for healthcare, cyber security and robotics
2. Apply the machine learning techniques for healthcare, cyber security and robotics
3. Analyze and compare the machine learning techniques for healthcare, cyber security and robotics

Unit I: Application of Artificial Intelligence in Cyber Security
Malicious event detection (worms, viruses), Emails fraud and spam, Network Anomaly detection, Network traffic identification, Knocking down CAPTACHS.

Unit II: Application of Artificial Intelligence in Robotics

Unit III: Application of Artificial Intelligence in Healthcare
Reference Books: