SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE
DEPARTMENT OF COMPUTER ENGINEERING
M. TECH. I YEAR (2YDC)
SEMESTER-B
Jan-June-2024
CO 71513: AGILE SOFTWARE DEVELOPMENT

COURSE OBJECTIVES: To enable students to understand the fundamental principles of Software Project Management and be familiar with the process and techniques used for software project management.

COURSE OUTCOMES: After completing the course student should be able to:
1. Demonstrate basic concepts and issues of software project management.
2. Demonstrate Planning, Execution and Evaluation of software projects.
3. Apply mechanisms for monitoring, tracking and risk management of software projects. 4. Design activities necessary to perform quality management and successful completion of Software Projects.

Lecture Plan

Sr. No.	Topics Covered	No. of lectures
1	Fundamentals of Software Engineering Concepts and Process	**1**
2	Software Development Life Cycle, Important Steps and Effort Distribution	**2**
3	Prototype Model, Incremental Model	**1**
4	Spiral Model, RAD	**1**
5	The Genesis of Agile, Introduction and background, Agile Manifesto and principles	**1**
6	Agile development Lifecycle, Agile Development Methods: Adaptive Software Development (ASD), Dynamic Systems Development Methods (DSDM)	**2**
7	Extreme Programming (XP): XP lifecycle, Feature Driven development	**1**
8	Lean Software Development, Kanban	**1**
9	Agile project management	**1**
10	Test Driven Development, Key Principles, Examples, and Tools & Techniques for each Agile development methods	**1**
11	Impact of Agile Processes in Requirement Engineering Requirements Elicitation and Management	**1**
12	Agility in Design, Agile Architecture, Agile Design Practices	**1**
13	Role of Design Principles, Agile Product Development	**1**
14	Automated build tools, Continuous Integration, Continuous Deployment, Refactoring, Team Dynamics and Collaboration	**1**
15	Introduction to Scrum, Agile Principles - Sprints Introduction, User Stories and Product Backlog	**1**

16	Estimation, Velocity, Burndown chart, Sprint Zero	**1**
17	Roles - Team Management and Structures, Product Owner, ScrumMaster / Team Lead, Implementation Team Members	**1**
18	Planning in Scrum - Planning, Planning Stakeholders, Planning Types	**1**
19	Sprint phases/meeting - Sprint Planning, Sprint Review, Sprint Retrospective, Product Demo, Daily Scrum calls	**1**
20	Agile Testing Principles, Practice and Processes	**1**
21	Difference between Testing in Traditional and Agile Approaches, Agile testing methods, techniques and tools	**2**
22	Estimating Test Efforts, Agile Metrics and Measurements	**1**
23	Agile Control: the 7 control parameters; Product Quality	**1**
24	Agile approach to Risk, Agile Approach to Configuration Management	**2**
25	Agility and Quality Assurance, Case study using any one of the framework	**2**

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CO71720: Deep & Reinforcement Learning

COURSE OBJECTIVES:

To provide a comprehensive skill for designing and implementation of real-life application development using the deep and reinforcement learning approaches.

COURSE OUTCOMES:

1. Define in-depth about theories, models and algorithms in deep learning.
2. Compare and contrast different learning algorithms with parameters.
3. Examine the nature of a problem at hand and find the appropriate learning algorithms and it's parameters that can solve it efficiently enough.
4. Design and implement of deep and reinforcement learning approaches for solving real-life problems.

Lecture Plan

Sr. No.	Topics Covered	No. of lectures
1.	CO's, Assessment policies, Scope of subject, What is covered? And what is not covered?	**1**
2.	Introduction to Deep Learning, Difference between deep learning & machine learning, tools and libraries used	**1**
3.	McCulloch Pitts Neuron, Thresholding Logic	**1**
4.	Perceptron neurons, perceptron algorithm	**1**
5.	Activation functions- identity, step, binary, sigmoid, tanh, ReLU, leaky ReLU, parametric ReLU, exponential ReLU, softmax, swish etc.	**1**
6.	Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, mini batch GD, AdaGrad, RMSProp, Adam, comparison between all variants of GD	**1**
7.	Eigen value, Eigenvalue Decomposition, PCA.	**1**
8.	Autoencoders and relation to PCA, different types of autoencoders, Denoising auto encoders, Sparse autoencoders, Contractive autoencoders	**1**
9.	Regularization: Bias Variance Tradeoff, L2 regularization	**1**
10.	Early stopping, Dataset augmentation, Parameter sharing and tying,	**1**
11.	Injecting noise at input, Ensemble methods, Dropout	**1**
12.	Batch Normalization, Instance Normalization, Group Normalization.	**1**

13.	Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods	**1**
14.	Learning Vectorial Representations Of Words- n-grams, TF-IDF, BOW etc	**1**
15.	Convolutional Neural Networks- convolution operation, padding, pooling, types of pooling, stride	**1**
16.	LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet	**1**
17.	Visualizing Convolutional Neural Networks, Comparison between all the above networks	**1**
18.	Guided Backpropagation, Deep Dream, Deep Art, Recent Trends in Deep Learning Architectures.	**1**
19.	Recurrent Neural Networks, motivation, types of RNN, applications of RNN	**1**
20.	Backpropagation through time (BPTT), Limitation of BPTT, Solution to it	**1**
21.	Vanishing and Exploding Gradients,Truncated BPTT, GRU, LSTMs	**1**
22.	Encoder Decoder Models, BLEU score, Attention Mechanism, Attention over images	**1**
23.	Introduction to reinforcement learning(RL), elements of RL	**1**
24.	Bandit algorithms – UCB, PAC,Thompson Sampling	**1**
25.	Median Elimination, Policy Gradient, Full RL & MDPs, Bellman Optimality, Dynamic Programming - Value iteration, Policy iteration, and Q-learning	**1**
26.	Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces	**1**
27.	Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces, Function Approximation, Least Squares Methods	**1**
28.	Fitted Q, Deep Q-Learning , Advanced Q-learning algorithms, Learning policies by imitating optimal controllers	**1**
29.	DQN & Policy Gradient, Policy Gradient Algorithms for Full RL,Hierarchical RL,POMDPs	**1**
30.	Actor-Critic Method, Inverse reinforcement learning,Maximum Entropy Deep Inverse Reinforcement Learning	**1**