

Department of Computer Engineering
M.Tech. I Year
CO71221: Machine Learning
Lecture Plan

Lecture	Topics
1	Introduction to machine learning (ML): Basics of ML, History of ML, Evolution of ML
2	Basic Terminologies used in ML, Training and Testing dataset, Cross validation, ML Models, Learning and testing models
3	Introduction to python for machine learning
4	Types of ML Techniques: Supervised, Unsupervised learning, Reinforcement Learning, Semi-supervised Learning, Examples and applications
5	Regression: Linear Regression and Logistic Regression
6	ML Tools, ML Algorithm and Convergence, Bias-Variance tradeoff
7	Various parameters for ML Techniques, Confusion Matrix, Accuracy, F1 score, Precision, Recall, MSE, MAE, Underfitting and Overfitting
8	Various domains and application of ML in these domain
9	Introduction to Neural Network, Neuron and its working, Artificial Neuron and Biological Neuron
10	Activation Functions and Types
11	McCulloch Pitts Neuron model, Single Layer Feed Forward Neural Network, AND Problem
12	XOR-problem, Perceptron, Loss Functions, Gradient Descent
13-14	Multilayer neural networks: back-propagation, back propagation calculus, Initialization, Training rules
15	Examples, issues in back-propagation, Introduction to Recurrent Neural Networks
16-17	Bayesian Learning, Naives Bayes Theorem, Example
18	Competitive Learning and Self-organization map, Example
19	Introduction to Support Vector Machine (SVM), Hyperplane, Maximum margin hyperplane
20	SVM Formulation, Interpretation & Analysis
21	Linear SVM, Computation of the margin of a MMH, Formulation of the optimization problem for linear SVM

22	Multiclass Classification using SVM, Hard and soft margin
23	SVM dual, SVM tuning parameters, Non-linear SVM
24	SVM Kernel Functions: Introduction, Types
25	Advantages and Applications of SVM
26	Introduction to clustering and Major Clustering Approaches: Partitioning Clustering, Hierarchical clustering, Model-based clustering, Density-based clustering, Graph-Theoretic Clustering
27-28	Similarity/Distance Measures in clustering, K-means Clustering, Example
29	Advantages, Disadvantages of K-means clustering, Model based clustering
30-31	Hierarchical Clustering, Agglomerative Clustering: Distance Matrix, Single Link, Complete Link, Average Link, Divisive Clustering, Examples
32	Density Based Clustering Algorithm, Example
33	Gaussian Mixture Models, Expectation Maximization
34	Birch Algorithm, CURE Algorithm, Parameters estimations – MLE, MAP
35-36	Learning Theory: Probably Approximately Correct (PAC) Model
37	PAC Learnability, Agnostic PAC Learning
38	VC Dimension and VC model
39	Theoretical analysis of machine learning problems and algorithms
40	Generalization error bounds

Dr. Anuradha Purohit

Semester: July 2022- Dec2022

CO71212: Information Security

LECTURE PLAN

S.No.	Topic
1)	Introduction to Information Security
2)	Security threats – Vulnerabilities
3)	Types of attacks-Active and Passive; Categories of attacks
4)	Security Goals
5)	Legal and Ethical Issues in Computer Security
6)	Classical Cryptography- Substitution and transposition
7)	Symmetric key Encryption- Concepts
8)	DES
9)	Triple DES algorithm
10)	Key distribution
11)	Diffie-Hellman Key exchange
12)	Public Key Cryptography
13)	RSA algorithm,
14)	ECC
15)	El-Gamal Algorithm
16)	Hash Functions and Message Authentication: MD5
17)	SHA-1, HMAC,
18)	Applications of cryptography
19)	PKI: Digital Signatures, Digital Certificates
20)	X.509 standard
21)	Authentication applications – Kerberos
22)	Access Control –Discretionary, Mandatory, Role Based Mechanisms,
23)	Security Policies: Definition, Types
24)	Vvarious models of security
25)	Program Security: Unexpected Behaviour
26)	Types of Flaws, Program Errors: Buffer Overflows
27)	Incomplete Mediation, Time-of-Check to Time-of-Use Errors;
28)	Covert channels, Controls against program threat
29)	Viruses and other malicious code, types of malicious codes; symptoms of infection, How malicious code works.
30)	User Authentication mechanisms
31)	Network Security Mechanisms-
32)	Vulnerabilities in Computer Network protocols- Specific to IP and TCP protocol
33)	Threats to computer network - Specific to IP and TCP protocol
34)	Security Protocols like IPSec
35)	Security at transport layer and application layer- SSL, TLS,
36)	SET
37)	Firewalls- types of firewall
38)	DMZ
39)	Intruders, Intrusion detection and prevention techniques

Dr. Urjita Thakar

CO71018: Advances in Operating Systems Lecture Plan

S.NO	Topics	No of Lectures
1.	Review of Operating System Fundamentals; Different Types, Dedicated Operating Systems; The Genesis of Modern Operating Systems.	3
2.	Operating Systems Design Strategies/ Kernel Architectures– Microkernels, Exokernels etc.	2
3.	Operating Systems Services, System Calls and their Implementation.	3
4.	File Systems: File Concept, Different Modules of a File System; File Protection; Disk Partitioning.	4
5.	Kernel I/O Subsystem; Advancements for improving File System Performance.	2
6.	System Calls for File Systems Management.	3
7.	Review of Main Memory Management Techniques including Virtual Memory.	3
8.	Process Management: Review of Process and Scheduling Concepts.	2
9.	System Calls for Process Management; IPC.	3
10.	Concept of Threads: Process v/s Threads, User Level & Kernel Level Threads, Threads Scheduling, Threading Issues, Solutions to Critical Section Problem and Synchronization for Threads.	4
11.	Scheduling in Multi-core Systems. Load Balancing Techniques for Multicore and Multiprocessor systems- Dynamic Load Balancing, Process Migration.	3
12.	Distributed Operating Systems: Design Issues; Overview of Distributed File Systems, Distributed Process Management and Distributed Memory Management.	4
13.	Embedded and IoT Operating Systems: Introduction, Characteristics and Features, Challenges and Issues in Designing the Operating Systems for Resource Constrained Systems.	3

14.	Virtualization: Basic Concepts, Benefits and Features, Building Blocks, Virtualization and O/S Components, Hypervisors; Virtual Machines, CPU and Memory Virtualization.	4
15.	Case Studies: Unix/Linux, Windows and Contemporary Embedded Operating Systems like Embedded Linux.	4
16.	Study of Source Code of Open Source Operating System like Linux.	3
	Total	50

Prof. D.A. Mehta

CO71018: Advances in Operating Systems Detailed Lecture Plan

Lec #	Topics
L 1.	Need/importance and Scope of subject.
L 2.	Review of Operating System Fundamentals; Different Types of O/S.
L 3.	Different Types of O/S; Dedicated Operating Systems.
L 4.	The Genesis of Modern Operating Systems.
L 5.	Operating Systems Design Strategies.
L 6.	Kernel Architectures– Microkernels, Exokernels etc.
L 7.	Operating Systems Services.
L 8.	System Calls and their Implementation.
L 9.	System Calls and their Implementation.
	Quiz - I
L 10.	File Systems: File Concept, Different Modules of a File System;
L 11.	Review of Disk Space Allocation Algorithms.
L 12.	File Protection.
L 13.	Disk Partitioning.
L 14.	Kernel I/O Subsystem.
L 15.	Advancements for improving File System Performance.
L 16.	System Calls for File Systems Management.
L 17.	System Calls for File Systems Management.
L 18.	System Calls for File Systems Management.
	Mid Term Test - I
L 19.	Review of Main Memory Management Techniques- Contiguous Allocation.
L 20.	Review of Main Memory Management Techniques- Non Contiguous Allocation.
L 21.	Virtual Memory.
L 22.	Process Management: Review of Process and Scheduling Concepts.
L 23.	CPU Scheduling Algorithms.
L 24.	System Calls for Process Management.
L 25.	System Calls for Process Management.

L 26.	System Calls for Process Management; IPC.
	Quiz - II
L 27.	Concept of Threads: Process v/s Threads.
L 28.	User Level & Kernel Level Threads.
L 29.	Threads Scheduling, Threading Issues.
L 30.	Solutions to Critical Section Problem and Synchronization for Threads.
L 31.	Scheduling in Multi-core Systems; Concept of Load Balancing.
L 32.	Load Balancing Techniques for Multicore and Multiprocessor systems.
L 33.	Dynamic Load Balancing, Process Migration.
	Mid Term Test- II
L 34.	Distributed Operating Systems: Design Issues.
L 35.	Overview of Distributed File Systems.
L 36.	Overview of Distributed Process Management.
L 37.	Overview of Distributed Memory Management.
L 38.	Embedded and IoT Operating Systems: Introduction.
L 39.	Embedded and IoT Operating Systems Characteristics and Features.
L 40.	Challenges and Issues in Designing the Operating Systems for Resource Constrained Systems.
	Quiz - III
L 41.	Virtualization: Basic Concepts, Benefits and Features
L 42.	Virtualization Building Blocks
L 43.	Virtualization and O/S Components, Hypervisors
L 44.	Virtual Machines, CPU and Memory Virtualization.
L 45.	Case Studies: Unix/Linux, Windows and Contemporary Embedded Operating Systems like Embedded Linux.
L 46.	Case Studies: Unix/Linux, Windows and Contemporary Embedded Operating Systems like Embedded Linux.
L 47.	Case Studies: Unix/Linux, Windows and Contemporary Embedded

	Operating Systems like Embedded Linux.
L 48.	Case Studies: Unix/Linux, Windows and Contemporary Embedded Operating Systems like Embedded Linux.
L 49.	Study of Source Code of Open Source Operating System like Linux.
L 50.	Study of Source Code of Open Source Operating System like Linux.
	Mid Term Test- III
L 51.	Old Exam Paper Discussion – I
L 52.	Old Exam Paper Discussion – II

Prof. D.A. Mehta

CO71016: PROGRAMMING SYSTEMS

Lecture plan

Sr. No.	Title	No. of Lecture
1	Programming fundamentals	6
	Flow charts & algorithms(1)	
	Computer languages(1)	
	Key words,Variables & data types(1)	
	Programming troubleshooting(1)	
	Structure of Program(1)	
	Input/output (1)	
2	Logic Building	10
	Loops & Decision making(1)	
	Arrays & it's Issues(1)	
	Functions(1)	
	Recursion(1)	
	Structures & Unions(2)	
	Pointers Concepts and It's Application(2)	
	File handling(1)	
	String & it's operations(1)	
3	Standard Template Library (STL)	8
	Components of STL(1)	
	Containers and it's types(3)	
	Iterators(1)	
	Boots libraries(2)	
	STL applications(1)	
4	Quality Programming	8
	Coding standards(1)	
	Code tuning techniques(1)	
	Version controlling:Git, CVC(2)	
	Error handling(2)	
	Documentation(2)	
5	Object Oriented Programming	8
	Concepts of OOPS(1)	
	Features of OOPs(3)	
	Comparisons(1)	
	OO Programming(3)	
	Total	40

CO71016: PROGRAMMING SYSTEMS**Lab plan**

Sr. No.	Lab tern	Assignment	Submission Date		Points	No of problems
1	Lab Tern - I	Assignment#00			0	5
2	Lab Tern - II	Assignment#01				
3	Lab Tern - III	Assignment#01	3-Lab-tern		15	30
4	Lab Tern - IV	Assignment#02				
5	Lab Tern - V	Assignment#02	5-Lab-tern		15	15
6	Lab Tern - VI	Assignment#03		1st Mid Term Submission	50	5
7	Lab Tern - VII	Assignment#03	7-Lab-tern		20	10
8	Lab Tern - VIII	Assignment#04				
9	Lab Tern - IX	Assignment#04	9-Lab-tern		20	10
10	Lab Tern - X	Assignment#05		2nd Mid term Submission	50	5
11	Lab Tern - XI	Assignment#05	11-Lab-tern		20	10
12	Lab Tern - XII	Assignment#06				
13	Lab Tern - XIII	Assignment#06	13-Lab-tern	Final Submission	100	15
				Total	300	80

Mr. Surendra Gupta