Computer Science And Engineering
(Jan-May '18)
GENERAL GUIDELINES

Do's:-

- Students should be on time for every lecture.

- Students are advised to show due respect to all faculty members.

- Students should keep the Classrooms, Laboratories and Workshops clean and tidy.

- Students must maintain absolute discipline and decorum, while on campus.

- **Students should come prepared with algorithm / flowchart / program / procedure for all the experiments before attending the laboratory session.**

- Students should bring the data sheets and laboratory records completed in all respects to the laboratory.

- Students are advised to clarify their doubts in the respective courses with the faculty.

- Students have to inform their parents that they should follow up the progress of their wards by being in touch with the institution authorities at regular intervals.

- **Students are advised to be present for the mentor meetings conducted by their respective Faculty Advisors, failing which appropriate disciplinary action will be taken.**

Don'ts:-

- Students are not permitted to attend the class without the identity card, once issued.

- **Ragging is strictly prohibited because it is punishable under Karnataka Education Act. Any student involved in ragging, will be severely punished – which includes handing over the case to Police, rustication from the college etc.**

- Writing on desks and walls is strictly prohibited, failing which the students will be fined heavily. If the identity of the individual is not established the entire class / students in the block will be fined.

- **Students must not use their cell phones during class hours. If any student is found using their cell phone during class hours it will be confiscated.**

- Students are not supposed to alter the configuration of the system / any software on the systems.

VIth Semester (2015-2019)

SI #.	Subject Code	Title of the Course	Lecture	Tutorial	Practical	Self Study	Credits
1	UE15CS351	Compiler Design	4	0	0	0	**4**
2	UE15CS352	Unix System Programming	4	0	0	0	**4**
3	UE15CS353	Machine Learning	4	0	0	0	**4**
4	UE15CS354	Compiler Design Laboratory	0	0	2	0	**1**
5	UE15CS355	Unix System Programming Laboratory	0	0	2	0	**1**
6	UE15CS356	Machine Learning Laboratory	0	0	2	0	**1**
		Elective-III					
7.	UE15CS331	Computer Network Security	4	0	0	0	**4**
8.	UE15CS332	Storage Area Networks	4	0	0	0	**4**
9.	UE15CS333	Natural Language Processing	4	0	0	0	**4**
10.	UE15CS334	High Performance Computing Architecture	4	0	0	0	**4**
11.	UE15CS335	Advanced Computer Networks	4	0	0	0	**4**
12.	UE15CS33X	Drone Computing	4	0	0	0	**4**
		Elective IV					
15.	UE15CS341	Cloud Computing	4	0	0	0	**4**
16.	UE15CS344	Knowledge management	4	0	0	0	**4**
17.	UE15CS345	Semantic Web Technologies	4	0	0	0	**4**
18.	UE15CS346	System Modeling and Simulation	4	0	0	0	**4**
19.	UE15CS348	Digital Image Processing	4	0	0	0	**4**
		TOTAL	**20**	**0**	**6**	**0**	**23**

UE15CS351 – Compiler Design (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portion covered	
			% of Syllabus	Cumulative %
1	**Unit 1**	**Compilers:** The Language Processing System	23.08	23.08
2	**Lexical Analysis** T1: Chapters 1, 3, 4 Introduction, 1.1 - 1.2 3.1–3.5, 3.8	The Phases of a Compiler		
3		The Phases of a Compiler		
4		The Phases of a Compiler		
5		The Phases of a Compiler, The Grouping of Phases into passes.		
6	**Syntax Analysis** T1: Chapter 4 4.1.1, 4.1.4, 4.4 : 4.4.1	**Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering,		
7		Specification of Tokens. Recognition of Tokens,		
8		Recognition of Tokens		
9		Design of a Lexical Analyzer Generator.		
10		**Syntax Analysis**: The role of the Parser, Error-Recovery Strategies.		
11		**Syntax Analysis**: Introduction to different parsers. Top–Down Parsing : RDP with Backtracking		
12		Top–Down Parsing : RDP with Backtracking		
13	**Unit 2 Syntax Analysis**	**Syntax Analysis**: Top–Down Parsing : Elimination of Left Recursion, Left factoring.	23.08	46.16
14	T1: Chapter 4 , 4.3.3, 4.3.4, 4.4.2 - 4.4.5, 4.5 - 4.7.4	Top–Down Parsing : First and Follow computation.		
15		Top–Down Parsing : LL(1) Parser		
16		Top–Down Parsing : LL(1) Parsing Algorithm		
17		Top–Down Parsing : Error recovery in LL(1) Parser		
18		Bottom-Up Parsing : Handle, Handle pruning, Shift-Reduce Parsing		
19		Bottom-Up Parsing : LR(0) Parser. The LR Parsing algorithm		
20		Bottom-Up Parsing : LR(0) Parser.		
21		Bottom-Up Parsing : SLR(1) Parser		
22		Bottom-Up Parsing : SLR(1) Parser, Viable Prefix		

23		Bottom-Up Parsing : CLR Parser, LALR Parser		
24		Bottom-Up Parsing : CLR Parser, LALR Parser		
25	**Unit 3** **Syntax Directed Translation** T1: Chapter 5 5.1, 5.2.1–5.2.4, 5.3.1, 5.3.2, 5.4.1 – 5.4.3 , 5.5.1, 5.5.3	**Syntax Directed Translation:** Syntax–directed Definitions, Inherited and Synthesised Attributes, S–Attributed SDD and its evaluation.		
26		S–Attributed SDD Examples		
27		L–Attributed SDD Examples		
28		L–Attributed SDD Examples.		
29	**Intermediate–Code Generation** T1: Chapters 6 6.3.3, 6.4.1, 6.6.3, 6.6.4, 6.8	Applications of Syntax-Directed Translation : SDD to generate Syntax tree for Expressions		
30		SDD to generate Syntax tree for Statements		
31		SDD to generate intermediate code for Expressions	**23.08**	**69.24**
32		SDD to generate intermediate code for programming constructs.		
33		SDD to generate intermediate code for programming constructs.		
34		Syntax Directed Translation Schemes : Postfix SDTs, Problematic SDTs.		
35		Converting L-attributed SDD to SDT scheme. Implementing L-attributed SDT scheme using Top-down Parsing.		
36		Implementing L-attributed SDT scheme using Top-down Parsing.		
37	**Unit 4** **Syntax Directed Translation** T1: 5.5.4	Implementing L-attributed SDT scheme using Bottom-Up Parsing.		
38		**Intermediate–Code Generation:** Advantages, Syntax Tree, DAG		
39		Three-Address Code : Format, examples.		
40	**Intermediate–Code Generation:** T1:16.1.1, 6.2	Data Structures for Three-address Code		
41		Data Structures for Three-address Code	**15.38**	**84.62**
42	**Code Generation:** T1:8.4 : 8.4.1, 8.4.3-8.4.6	SSA Form		
43		Control Flow Graph generation, Converting CFG to SSA Form.		
44	**Machine Independent Optimization :** T1:9.1	**Machine Independent Optimization**: Different Optimizations.		

45	**Unit 5**	**Machine Independent Optimization**: Optimization on CFG.		
46	**Code Generation** T1:8.4 : 8.4.2, 8.5	Next-use Algorithm.		
47	**Machine Independent Optimization:** T1:9.2.5	Live-variable Analysis.	**15.38**	**100**
48		Live-variable Analysis.		
49		**Code Generation:** Issues in the design of a Code Generator. The Target Language.		
50	**Run Time Environments,** T1:7.1–7.3	Storage allocation Strategies : Static Allocation (target code generation), Stack Allocation : Activation tree		
51	**Code Generation,** T1:8.1– 8.3, 8.5	Activation Record, Calling Sequence, Return Sequence, Nested Procedures : Access Links, Displays.		
52		Code Generation for Procedures (stack allocation)		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Book	T1	**Compilers–Principles, Techniques and Tools** Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffery D. Ullman	2nd	Pearson Education	2009
Reference Book	R1	"Modern Compiler Design", Dick Grune, Kees van Reeuwijk, Henri E. Bal, Ceriel J.H. Jacobs, Koen Langendoen,	2nd	Pearson Education	2012

Computer Science And Engineering
(Jan-May '18)
UE15CS352: Unix System Programming (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portions Covered	
			% of Syllabus	Cumulative %
1, 2	**Unit 1**	Introduction, UNIX Architecture,	20	20
3, 4	**Unix System Overview**	File I/O: Introduction, File Descriptors, open Function, create Function, close Function,		
5, 6	Ch. 1	lseek Function, read Function, write Function, I/O Efficiency,		
7, 8	Ch. 3	File Sharing, Atomic Operations, dup and dup2 Functions,		
9, 10		sync, fsync, fdatasync Functions, fcntl Function, ioctl Function.		
11, 12	**Unit 2**	Introduction, stat, fstat, and lstat Functions,	20	40
13, 14	**Files & Directories**	File Types, Set–User–ID and Set–Group–ID, File Access Permissions, Supplementary Groups, Access Control Lists,		
15, 16		Ownership of New Files and Directories, access Function, umask, chmod, fchmod Functions, Sticky bit ,chown, fchown, & lchown Functions,		
17, 18	Ch. 4	File Size, File Truncation, File Systems, Journaling File System, link, unlink, remove, and rename Functions,		
19, 20		Symbolic Links, symlink & readlink Functions, File Times, utime Function,		
21,22		mkdir, and rmdir Functions, Reading Directories, chdir, fchdir getcwd Functions.		
23,24	**Unit 3**	Introduction, main Function, Process Termination, Command–Line–Arguments, Environment List,	20	60
25,26	**Process Environment**	Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit and setrlimit Functions.		
27, 28	Ch. 7	Process Control: Introduction, Process Identifiers, PID namespaces,		
29, 30		fork, vfork, exit Functions, wait, waitpid, Functions,		
31, 32	Ch. 8	Race Conditions, exec Functions, system Function.		
33, 34	**Unit 4**	Introduction, Terminal Logins, Network Logins,	20	80
35, 36		Process Groups, Sessions, Controlling Terminal, Job Control		
37, 38	**Process Relationships**	Signals: Introduction, Signal Concepts, signal Functions, Unreliable Signals, Interrupted System Call,		
39, 40		Reentrant Functions, kill, raise Functions, alarm, and pause Functions,		
41, 42	Ch. 9 Ch. 10	Signal Sets, sigprocmask Function, sigpending, sigaction Functions, sigsetjmp, siglongjmp Functions, sigsuspend, abort, system, sleep Functions.		
43, 44		Introduction, Pipes, popen, & pclose Functions, Co-processes,	20	100

45, 46	**Unit 5**	FIFOs, XSI IPC, Message Queues, Semaphores, Shared Memory.		
47, 48	**Inter-process Communication:** Ch. 15	Threads: Introduction, Thread Concepts, Thread Identification, Thread Creation, Thread Termination,		
49, 50	Ch. 11	Thread Synchronization, Mutexes, Deadlock Avoidance, Condition Variables.		
51, 52		Guest Lecture		

Literature

Book Type	Code	Author & Title	Publication Info		
			Edition	**Publisher**	**Year**
Text book	T1	"Advanced Programming in the UNIX Environment", W. Richard Stevens, Stephen A. Rago	2nd	Pearson Education	2013
Text book	T2	"The Linux Programming Interface", Michael Kerrisk	1st		2010
Refs	R1	**1.** http://man7.org/linux/man-pages/man7/pid_namespaces.7.html			

UE15CS353: Machine Learning (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portion Covered	
			% of Syllabus	Cumulative %
1	**Unit 1 : Introduction & Basics** T1: Ch1, Ch2 T2:Ch1,Appendix B,C T4:Ch1,Appendix A	Introduction, Well Posed Learning Problems	19	19
2		Perspectives and Issues, designing learning systems		
3		Concepts of hypotheses, Version space, inductive bias, Concept learning with FIND-S		
4		Candidate Elimination Algorithm		
5		Review of Linear Algebra		
6		Probability basics and Random Variates.		
7		Decision Trees- Basic algorithm,		
8		Hypothesis search and Inductive bias		
9		Issues in Decision Tree Learning - overfitting		
10		Solutions to overfitting, dealing with continuous values		
11	**Unit 2 : Classification and Regression** T1 :Ch3,Ch4,Ch8 T2 : Ch6, Ch7	Instance-based learning: k-nearest neighbor learning	24	43
12		Issues with KNN - discussion		
13		Artificial Neural networks: Introduction		
14		Perceptrons		
15		Multi-layer networks and back-propagation		
16		Back-propagation derivation		
17		Activation Units - discussion		
18		Support Vector Machines – margin and maximization		
19		SVM - The primal problem, the Lagrangian dual		
20		SVM – Solution to the Lagrangian dual, simple problems		
21		Improving performance with Ada-boost		
22		Combining weak learners, simple problems.		
23	**Unit 3 : Stochastic Learning** T1: Ch6, Ch9 T4: Ch15	Bayesian Learning – Bayes theorem, Concept learning	19	62
24		Maximum likelihood, Bayes optimal classifier		
25		Gibbs algorithm, Naïve Bayes classifier		
26		Document and Text classification		
27		Genetic Algorithms – Representing hypothesis, Genetic operators and Fitness function and selection		
28		Simple applications of the Genetic Algorithm		
29		Hidden Markov models – discrete Markov processes		
30		Hidden Markov models – 3 basic problems,		
31		Finding State sequence, Learning model parameters		
32		Simple problems.		
33	**Unit 4 : Un-supervised Learning** T2: Ch10,Ch11, Ch12	Un-supervised Learning: Hierarchical vs non-hierarchical clustering, Agglomerative and divisive clustering	19	81
34		K-means clustering, simple problems		
35		Bisecting k-means, issues with k-means.		
36		Density-based clustering - The DBSCAN (Density-based spatial clustering of applications with noise)		
37		DBSCAN vs K-Means		
38		Apriori algorithm - Association analysis, the Apriori principle.		
39		Finding frequent itemsets, mining association rules		
40		FP-growth – FP trees, building an FP-tree		

41		Mining frequent items from an FP-Tree		
42		Mining frequent items from an FP-Tree		
43		Dimensionality reduction techniques - PCA		
44		Principal component analysis example		
45	**Unit 5 : Dimensionality Reduction and Recent Trends in ML** T2: Ch13, Ch14	Singular value decomposition (SVD)	19	100
46		SVD example and applications.		
47		Deep Learning: Introduction		
48		Convolutional Neural networks (CNN)		
49		CNN		
50		Reinforcement Learning		
51		Reinforcement Learning: Q-Learning, example		
52		Generative Adversarial Networks(GAN)		

Literature

Book Type	Code	Author & Title	Publication info		
			Edition	**Publisher**	**Year**
Reference Books	T1	**Machine Learning -** Tom M. Mitchell	Indian Ed.	McGrawHill Education	2013
	T2	**Machine Learning in Action -** Peter Harrington	First Ed.	DreamTech Press (India)	2015 (Reprint)
	T3	**Pattern Recognition and Machine Learning -** Christopher Bishop	First Ed.	Springer	2011 (Reprint)
	T4	**Introduction to Machine Learning -** Ethem Alpaydin	First Ed.	PHI Learning	2017
	T5	**Appropriate handouts for introduction to Linear Algebra, Random Variates, Recent Trends in ML**	-	-	-

UE15CS354: Compiler Design Laboratory (0-0-2-0-1)

Lab#	Program No	Title of the program/ Problem Statement
1	Program 1	Lex to count number of char, words, newlines, and white spaces
2	Program 2	Lex to remove comment lines
3	Program 3	Yacc to validate identifiers (or a given set of statements).
4	Program 4	Yacc to validate context free grammars
5	Program 5	Yacc to implement semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
6	Program 6	Yacc to validate Nested IF–ELSE construct
7	Program 7	Convert The BNF rules into Yacc form and write code to generate abstract syntax tree.
8	Program 8	Mini Project
9	Program 9	Mini Project
10	Program 10	Mini Project
11	Program 11	Mini Project
12	Program 12	Mini Project
13	Program 13	Mini Project

UE15CS356: Machine Learning Laboratory (0-0-2-0-1)

Lab#	Program No	Title of the program/ Problem Statement
1	Program 1	Sample Programs : refreshing Python and numpy library functions
2	Program 2	Team Formation : Project Title Approval: Continued with sample programs
3	Program 3	Program using Decision Trees
4	Program 4	Program using KNN algorithm
5	Program 5	Artificial Neural Network program
6	Program 6	Artificial Neural Network program
7	Program 7	Project Progress review #1
8	Program 8	Program using Genetic Algorithm
9	Program 9	Program Using Naïve Bayes
10	Program 10	Program using K Means clustering algorithm
11	Program 11	Project Progress Review #2
12	Program 12	Program on FP Growth
13	Program 13	Final Project Review

UE15CS331: Computer Network Security (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portions Covered	
			% of syllabus	Cumulative %
1-2	**Unit 1: Overview and Perimeter Security** T1:Ch1, 8, 9 Plus Readings:	**Overview** : Computer Security Concepts, Requirements, Architecture, Trends, Strategy	20%	20%
3-6		**Firewall and Intrusion Prevention systems** : Firewalls, Types of Firewalls, Intrusion Prevention, Unified Threat management		
7-10		**Intrusion Detection** : Intrusion Detection, Host based, Network based, Honeypots		

		Readings :
		For Overview
		
		   1. Measuring Pay-per-Install: The Commoditization of Malware Distribution by J. Caballero, C. Grier, C. Kreibich, V. Paxson (gives a feel of security market)
		
		For Perimeter Security
		
		   1. Intrusion and intrusion detection by John McHugh (highlighted 3 and section 4 rest optional)
		   2. Next generation firewalls by Gartner, Palo Alto
		   3. Magic Quadrant for Enterprise Network Firewalls, Gartner
		
		Optional Readings :
		
		   1. https://www.owasp.org/index.php/Application_Threat_Modeling
		   2. Reflections on trusting trust by Ken Thompson
		   3. Gartner=Designing an Adaptive Security Architecture
		   4. Distributed Firewall by Bellovin		

11-14	**Unit 2: Authentication and Access Control** T1: Ch 3,4,23	**User Authentication** : Password, Password-based, token based, Biometric, Remote User authentication	20%	40%
15 - 17		**Access Control** : Principles, Access Rights, Discretionary Access Control, Unix File Access Control, Role Based Access Control		

18 - 21	Readings	**Internet Authentication Applications** : Kerberos, X.509, PKI, Federated Identity Management		
		Readings :		
		1. The Quest to Replace Passwords: A Framework for Comparative Evaluation of Web Authentication Schemes.		
		Optional readings :		
		1. Operating Systems Security, T. Jaegeri, 2008. Chapter 4, Security in Ordinary Operating Systems.		
		2. SetUID Demystified, Chen, Dean, and Wagner, 2002. (till section 5)		
		3. Steiner, Jennifer G., Clifford Neuman, et al. "Kerberos: An Authentication Service for Open Network Systems." *USENIX Conference* (1988).		
		4. Intelligence Driven Identity and Access Management - EMC		
31-33	**Unit 3: Cryptographic Tools and Algorithms** T1: Ch 2,20,21	**Cryptographic Tools** : Confidentiality with symmetric encryption, Message Authentication & Hash Functions, Digital Signatures, Random Numbers	21%	79%
34-37		**Symmetric Encryption and Message Confidentiality** : DES, AES, Stream Ciphers, Cipher Block Modes of Operation, Key Distribution		
38-41		**Public Key Cryptography and Message Authentication** : Secure Hash Functions, HMAC, RSA, Diffie Hellman Algorithms		
		Readings :		
		1. Programming Satan's Computer Ross Anderson and Roger Needham		
		2. SSL certicates – Symantec whitepaper		
		T1: Ch: 2 , Ch: 20 , Ch: 21		
		Optional Readings :		
		1. Why crypto systems fail - Ross Anderson		
		2. Cryptography protocol practices – Needham		
		3. The BREACH attack: encryption and compression don't mix, by Gluck, Harris, and Prado (Read at least overview)		
		4. Handbook of Applied Cryptography, by A. Menezes, P. van Oorschot, and S. Vanstone (for basics)		
42-45	**Unit 4: Security Protocols, Malware and Software Security**	**Internet Security Protocols and standards** : SSL, TLS, IPSEC, S/MIME	21%	100%
46-48		**Malicious Software** : Types of Malware, Viruses & Counter Measures, Worms, Bots, Rootkits		

49-52	T1:
	Ch: 22,6,10,11?
		Software Security : Buffer Overflows, Sta;ck overflows, Defense, Other overflow attacks, Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output
		
		Readings :
		  1. Smashing The Stack For Fun And Profit, Aleph One
		  2. Advanced-targeted-attacks – Fireeye
		  3. Gartner 2013- Threats from SSL traffic
		
		T1: Ch: 22 , Ch: 6 , Ch: 10, Ch 11?
		
		Optional Readings :
		  1. Buffer Overflow : A;ttacks and Defenses by Crispin Cowan
		  2. ForceHTTPS: protecting high-security web sites from network attacks, by A. Barth and C. Jackson (Prefer Mandatory ☺)
		  3. The case for short-lived certificates. by Topalovic et al. (only the problem)		

	Unit 5: **Network** **Protocols &** **Android** **(Optional based** **on time)**	**Network Protocol security :** TCP/IP and other network protocols security		
		Android security		

		Readings :
		
		  1. A look back at Security Problems in the TCP/IP Protocol Suite, S. Bellovin, ACSAC 2004.
		  2. Understanding Android Security Enck, Ongtang, and McDaniel, 2009 (Security Enforcement section)
		
		Optional Readings :
		  1. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, Enck et al.		

Literature

Book Type	Code	Author & Title	Publication		
			Edition	**Publisher**	**Year**
Text book	T1	Computer Security : Principles and Practice, William Stalling & Lawrie Brown,	3rd Edition	Pearson	Nov 2015

UE15CS332: Storage Area Networks (4-0-0-0-4)

# of Hours:52

Class #	Chapter Title/Reference Literature	Topics to be Covered	% of Portions covered	
			% of syllabus	Cumulative %
1-2	**Unit 1 Introduction to Storage Systems and Intelligent Disk Systems**	Introduction to Storage Systems	23.00	23.00
3-4		Fundamental Architectures of Storage systems		
5-6		Relevance of Storage Networking		
7-8		Architecture of Disk Subsystems		
9-12		JBODs, RAID Levels, Instant Copies, Remote Mirroring, Availability of Disk Subsystems		
13-15	**Unit 2 Storage Area Network & NAS**	IO Path, SCSI	29.00	52.00
16-21		Fibre Channel		
22-23		IP Storage: iSCSI and others		
24-27		NAS Architecture		
28-30	**Unit 3 Cloud Storage and Storage Virtualization**	Cloud storage	18.00	70.00
31-32		Writing to storage		
33-36		Storage Virtualization		
37-39	**Unit 4 SAN Arch, SAN Management and Archival, Backup**	SAN HW and SW Arch	18.00	88.00
40-42		SAN Management		
43-46		Archival, Backup and Restoration		
47-48	**Unit 5 Security and iSCSI deployment demo**	Security	12.00	100.00
49-50		iSCSI deployment demonstration		
51-52		iSCSI deployment demonstration		

Literature

Book Type	Code	Author & Title	Publication info		
			Edition	Publisher	Year
Reference Books	T1	Ulf Troppens, Rainer Erkens and Wolfgang Muller: **Storage Networks Explained**	Wiley Second		2009
	T2	Storage Networks: The complete Reference Robert Spalding	Osborne		2003
	T3	Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Rainer Erkens and others	Wiley		2015
	T4	Storage Area Network Essentials: A complete Guide to Understanding and Implementing SANs	Wiley		2001
	T5	Various Articles from Internet, Published Papers	-	-	-

UE15CS335 : Advanced Computer Networks (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be covered	% of Portions Covered	
			% of syllabus	Cumulative %
1	**Unit 1 - Introduction & Supplementary topics to the topics studied in 5th Sem** T1-1.1 - 1.7 T2-4.3.5 T2-5.4 T2-5.4 ISN	Why Next generation networks ?		
2		Elements of modern networking		
3		Selected topics of Computer Networks – revisited -Insight into IPV6		
4		IPV6-Header- Migration from IPV4 to IPV6		
5		Forwarding in routers		
6		Hierarchical routing in internet, Autonomous system		
7		BGP		
8		VLANs- Definition-Benefits		
9		Implementation of VLANs	17	17
10	**Unit 2 -Wireless & Mobile Networks** T2-7.1 - 7.7	Wireless & Mobile Networks-Introduction		
11		Wireless links and network characteristics		
12		Cellphone Networks -How is it different from wireline telephone network ?		
13		An overview of Cellular Network Architecture		
14		Sample MAC protocol in cellphone networks-CDMA		
15		Mobility Management : Principles in general		
16		Managing mobility in cellular networks		
17		Routing calls –Handoffs in Cellphone network		
18		2G-3G-4G-5G : What do they mean ?		
19		Architecture of 3G & 4G-Introduction to LTE		
20		Wi-Fi – 802.11 Wirelss LANs -Architecture		
21		Wi-Fi MAC protocol		
22		Wi-Fi -Mobility & Advanced features	24	41
23	**Unit 3-Internet Of Things** T1-14.1 - 15.2	The IOT Era; Scope of Internet Of Things		
24		Components of IOT –Enabled Things		
25		IOT – Architecture		
26		ITU-T IOT Reference model		
27		IOT World forum Reference model		
28		IOT Implementation		
29		IOT Case study #1		
30		IOT Case study #2 (Guest Lecture)	16	57
31	**Unit 4-Software Defined Network**	SDN - Background and Motivation	23	80
32		The SDN approach		
33		SDN - Data Plane & OpenFlow-Introduction		

34	**-SDN**	Dataplane functions & protocols		
35		Flow Table structure		
36	T1-3.1-3.2	SDN - Control Plane		
37	T2-4.1	Architecture		
38	T14.1 -4.3 T2-4.4	ITU-T Model		
39	T1-5.1-5.2	SDN - Application plane		
40	T2-5.5 T1-6.1	Architecture		
41	ISN	SDN - Case study #1-		
42		SDN-Case study #2 (Guest Lecture)		
43	**Unit 5-**	Multimedia Networking-Properties of Audio, Video		
44	**Multimedia**	Types of Multimedia Network Applications		
45	**Networking**	Internet telephony - Introduction and evolution		
46		Internet telephony - Buliding blocks	20	100
47	T2-9.1 ISN	Voice digitisation -VOIP principles		
48	T2-9.3	Protocols for Real-time applications		
49	T2-9.4	RTP		
50		SIP		
51		Revision		
52		Revision		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Book-T1	T1	Foundations of Modern Networking, William Stallings	1	Addison-Wesley	2015
Text Book-T2	T2	Computer Networking - A Top-down approach, James F Kurose, Keith W	7	Pearson	2016
Reference Book-R1	R1	Next Generation Network Services-- Technologies & Strategies, Neill Wilkinson	[Special Indian Edition]	Wiley	2015
Reference Book1-R2	R2	Computer Networks- A Top-down Approach - Behrouz A Forouzan, Firouz Mosharraf	[Special Indian Edition]	Pearson	2012
Supplementary reference	ISN	Internet links & Supplementary Notes provided by the faculty			

Computer Science And Engineering
(Jan-May '18)
UE15CS341 : Cloud Computing (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portion covered	
			% of Syllabus	Cumulative %
1	**Unit 1**	Introduction – background, business case		
2		Introduction – computing models, history		
3	**Introduction and Background**	Hands On: IaaS Model setup and configuration		
4		Background: REST and RPC		
5		Background – principles of distributed computing and Hands On	19.5	19.5
6	**Unit 2**	Openstack overview with Nova		
7	**IaaS basics**	HandsOn – with Nova		
8		Openstack – deep dive - Swift		
9		Hands On – Using Swift		
10		OpenStack – deep dive - Cinder		
11		Hands On – Connecting Cinder to VM	23.0	42.5
12	**Unit 3**	Paas Programming Model		
13		Hands On – Extending to PaaS programming model		
14		Containers – introduction.		
15	**Paas**	Hands On – creating containers.		
16		Container Orchestration	19.5	61.5
17	**Unit 4**	Scaling computation		
18	**Design considerations**	Scaling Storage		
19		Hands on: Scaling to multiple nodes.		
20		Software as a service and Multitenancy		
21		Hands on: making multitenant applications.	19.5	80.7
22	**Unit 5**	Software Virtualuzatiton		
23	**Security and Futures**	Hardware Virtualization		
24		Cloud Security		
25		Cloud data center security	19.5	100
26		Hands On: Project presentations		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Book	T1	Dinkar Sitaram and Geeta Manjunath, "Moving to the cloud- Developing Apps in the new world of Cloud Computing"	1	Elsevier	2012

UE15CS344: Knowledge Management (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title/ Reference Literature	Topic To be Covered	% of Portion covered	
			% of Syllabus	Cumulative %
1	Unit 1: The Basics: T1: Chapter 1,2 and Chapter3 pages:25-113	Working smarter, KM myths and lifecycle	23%	23%
2		Implications of KM. Understanding knowledge		
3		Definitions, cognition and KM		
4		Data, information and knowledge		
5		Types of knowledge, expert knowledge,		
6		Human thinking and learning, implications for KM		
7		Knowledge Management systems lifecycle		
8				
9		Challenges, conventional versus KM system lifecycle		
10				
		Implications for KM. KM Strategy		
		Economy of plan		
		Economy of change		
11		Economy of control.		
12				
13	Unit 2: Knowledge Creation and Capture: T1:Chapter 3, Chapter 4 and Chapter 5: pages: 83-162	Knowledge creation and knowledge architecture	15.4%	38.4%
14				
15		Nonaka's model, Knowledge architecture		
16		Implications, capturing tacit knowledge,		
17		Knowledge capture, evaluating the expert, developing a relationship with experts		
18		Fuzzy reasoning and quality of knowledge		
19		Interview as a tool, guide to a successful interview, rapid prototyping, implications.		
20				
21	Unit 3: Design of KM Systems: T1:Chapter 5 and Chapter 6: pages: 144-237	Economy of scope, economy of effort, economy in deployment. Other knowledge capturing techniques	27%	65.4%
22		Onsite observation, brain-storming		
23		Protocol analysis, consensus decision making, the repertory grid		
24		NGT, Delphi method, concept mapping, and black-boarding		
25		Knowledge codification, why codify, modes of knowledge conversion, how to codify knowledge		
26		Codification tools and procedures, knowledge developer's skill set, implications		
27		System testing and deployment – quality and assurance, knowledge testing, approaches to logical and user acceptance testing		
28		Managing the test phase, KM system deployment, issues		
29		User training and deployment		
30		Post-implementation review, implications		

31		Knowledge transfer and sharing - as a step in a process		
32				
33		Transfer methods, role of internet, implications.		
34				
35	**Unit 4:** **Knowledge transfer in E-World:** T1: chapter 9 and Chapter 10 and Chapter 11: pages 303-369	The E-World, E-Business, implications, KM System tools and portals	**17.1%**	**82.5%**
36		Data visualization, neural networks as a learning model		
37		Association rules		
38		Learning from data, classification types, implications		
39		Data mining – knowing the unknown, data mining and business intelligence		
40		Business and technical drivers, DM virtual cycle and data management		
41		DM in practice, role of DM in customer relationship, implications		
42		Knowledge Management tools and portals		
43		Portals the basics, Business challenge, Knowledge Portal		
44	**Unit5:** **Technologies, implications. Ethical, legal and Managerial issues:** T1: chapter 14: pages 410-430	Knowledge owners	**17.5%**	**100%**
45		legal issues		
46		Ethical factor		
47		Improving the climate,		
48		Implications		
49		Case study		
50		Case study		
51		Case study		
52		Case study		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Book	T1	Knowledge Management, Elias M. Awad and Hassan Ghaziri	-	Pearson Education Inc	2007
Text Book	T2	Ten Steps to Maturity in Knowledge Management – Lessons in Economy, J.K. Suresh and Kavi Mahesh	6th	Chandos Publishing	2006

UE15CS345: Semantic Web Technologies (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title/Reference Literature	Topics to be Covered	% of Portions Covered	
			% of syllabus	**Cumulative %**
1.	**Unit 1** **Introduction to Semantic Web** T1: Ch 1 , T2:Ch 2, XML Material	Web, Web 2.0, Syntactic Web, Web 3.0 and Semantic Web	19	19
2.		Web, Web 2.0, Syntactic Web, Web 3.0 and Semantic Web		
3.		Why Semantic Web		
4.		Impact of Semantic Web		
5.		Myths about Semantic Web		
6.		Semantic Modeling		
7.		Semantic Modeling		
8.		Introduction to XML		
9.		XML Schema		
10.		XML Parsing		
11.	**Unit 2** **Resource Description Framework (RDF)** T1: Ch.3, Ch. 4	Introduction to Knowledge Representation (KR) formalisms	19	38
12.		Metadata and KR for the Web;		
13.		the Layer Cake		
14.		Attribute Languages		
15.		Description Logic and Inference		
16.		RDF statements, triples and graphs		
17.		RDF/XML		
18.		RDF stores and databases;		
19.		RDF parsers		
20.		Inference in RDF.		
21.	**Unit3** **Ontologies** T1: Ch 2 + Reference Material	Introduction to Classification Theory	19	57
22.		Introduction to Classification Theory		
23.		Vocabulary, Thesauri		
24.		Taxonomy and Ontology;		
25.		Taxonomy and Ontology;		
26.		Types of ontologies		
27.		Types of ontologies		
28.		Ontology exemplars		
29.		Ontology exemplars		
30.		Introduction to ontological engineering.		
31.	**Unit 4** **RDF Schema and OWL** T1:Ch 5 T2:Ch 6,7,8,9	Defining hierarchies in RDFS; RDFS modelling	19	76
32.		RDFS-Plus		
33.		Microformats, RDFa, SKOS;		
34.		FOAF; Basic OWL		
35.		Class, Properties and Constraints		
36.		Individuals;		
37.		XSD Datatypes		
38.		Class Axioms		
39.		Ontology development methodology;		

40.		Ontology tools - SPARQL.		
41.		Applications of Semantic Web;		
42.		Software Agents		
43.		Semantic Search;		
44.	**Unit 5**	Knowledge Management		
45.		Semantic Desktop; Semantic Web Services		
46.		Semantics in Social Networking;	24	100
47.	**Applications and Trends**	Geospatial Semantic Web		
48.	T1: Ch. 6,7,11,12,	Rule Languages		
49.		RIF and business systems		
50.		RSS, MOM, EAI, SOA, EII, and ETL		
51.		RSS, MOM, EAI, SOA, EII, and ETL		
52.		The Future of the Net.		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	**Publisher**	**Year**
Text Book	T1	**Semantic Web: Concepts, Technologies and Applications** Karin K. Breitman, Marco Antonio Casanova and Walter Truszkowski		Springer	2007
Text Book	T2	**Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL** Dean Allemang and James Hendler	2nd	Morgan Kaufmann	2011

UE15CS346: System Modelling and Simulation (4-0-0-0-4)

# of Hours: 52

Class #	Chapter Title/Reference Literature	Topics to be Covered	% of Portions Covered	
			% of Syllabus	Cumulative %
1	**Unit 1** **Introduction to Simulation:** T1: 1.1-1.12,2.1-2.6	Principles of modeling and simulation;	23.10	23.10
2		Model taxonomies;		
3		Fundamentals of queuing theory;		
4		Random variate generation;		
5		Monte Carlo simulation;		
6		Performance measures of queuing systems		
7	**Unit 2** **Building Discrete Event Simulation Models** T1: 3.1,6.1-6.3, Papers related to simulation of computer systems Project Stage I	Managing event lists	18.60	41.70
8		Queue disciplines, and priorities		
9		Application to simulation of computer subsystems and concurrent processes.		
10-11		Project selection & literature survey presentations		
12	**Unit 3** **Introduction to simulation languages and packages,Design of Simulation Experiments** T1: 9.1-9.7, 10.1-10.4, 11.1-11.3,12.1-12.3	Input data analysis to determine distributions	15.38	57.08
13		Analysis of simulation output		
14		Tests of significance and design of experiments		
15		Variance Reduction Techniques		
16	**Unit 4** **Continuous System Simulation** T2: 25.1-25.4, 28.2	Modeling systems using differential equations	19.23	76.31
17		Principles of numerical integration		
18		Numerical integration methods,		
19		Simulation of discontinuities (combined discrete-continuous simulation),		
20		Application to population ecology and other systems.		
21	**Unit 5** **Agent Based Simulation (Refer class notes, publicly available material on this topic)**	The need for agent based simulation, agent concepts – characteristics and interaction topologies,	23	100
22		Agent based simulation platforms (NetLogo and others),		
23		Applications examples.		
24-26	Project Final	Project Work and Presentations		

Literature:-

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Book	T1	**Discrete Event System Simulation,** By Jerry Banks Et Al	5th	Pearson Education	2013
	T2	**Numerical Methods For Engineers** By Steven C. Chapra& Raymond P. Cana	6th	McGraw Hill	2015
	T3	**Simulation With Arena** By W. David Kelton Et Al	5th	McGraw Hill	2013

UE15CS 348 – Digital Image Processing (4:0:0:0:4)

# of Hours: 52

Class #	Chapter Title / Reference Literature	Topics to be Covered	% of Portion covered	
			% of Syllabus	Cumulative %
1	**Unit 1**	**Introduction to digital image processing**		
2	**Introduction**	Origins, example fields and various components		
3	T :Chapter 1,2	Basics of visual perception		
4		Image acquisition		
5		Sampling		
6		Quantization	**19.23**	**19.23**
7		Relationship between pixels		
8		Review of relevant linear algebraic concepts		
9		Interesting problems in the field of image processing		
10		Case studies		
	Unit 2	**Image enhancement in the spatial domain: background**		
11		Basics of spatial processing, Negative, log,, power law		
	Image	Piece wise linear functions		
12	**enhancement**	Histograms and using histogram statistics for processing		
13	**In the spatial**	Histogram equalization and matching	**19.23**	**38.46**
14	**domain**	Mechanics of spatial filtering		
15	T:Chapter 3	Correlation and convolution		
16	3.1-3.6	Smoothing and sharpening filters, order statistics filtering		
17		First and second derivatives for filtering		
18		Image gradient		
19		Case studies/ review		
20		Case studies/ review		
21	**Unit 3**	**Image Enhancement in the frequency domain**		
		Basics of the Fourier transform and interpreting an image in the transformed domain		
	Image	Correspondences between the space and frequency domains		
22	**enhancement**	Smoothing in the frequency domain	**19.23**	**57.69**
23	**in the**	Sharpening in the frequency domain		
24	**frequency**	Ideal versus optimal filters		
25	**domain**	Types of noise that can affect an image and enhancement		
26	T1: Chapter 4, 7	Evaluating the performance of the filter		
27	,4.7-4.10	Introduction to multiresolution transformations or the space-frequency domain		
28	7.1	Image transformation and subband coding for denoising, compression and feature extraction		
29		Case studies/ review		
30		Case studies/ review		
31	**Unit 4**	**Morphological processing basics**		
32		Erosion, dilation, open and closing		
33	**Morphological**	Hit or miss		
34	**processing and**	Some algorithms – boundary extraction, hole filling, thinning		
35	**image**	Gray scale morphology		
36	**segmentation**	**Segmentation basics** – point, line and edge detection	**19.31**	**77.00**
37	T: Chapter 9,	Thresholding – global, using Otsu's method, multiple thresholds		
38	10,9.1-9.6	Segmentation using region-growing and region-merging		
39	10.1-10.5	Segmentation using morphological operations revisited		
40		An overview of other segmentation techniques		

41	**Unit 5**	**Color image processing basics**	**23.00**	**100**
42		Color models, pseudo color images		
43	**Color image**	Color transformations		
44	**processing and**	Smoothing and sharpening of color images		
45	**basics of image**	Image segmentation based on color		
46	**compression**	Noise in color images		
47	T :Chapters 6,	**Basics of image compression** - concept of redundancy		
48	8,6.1-6.9	Some encoding techniques – Huffman coding		
49	8.1-8.2	Run length coding, symbol based encoding		
50		Block transform coding		
51		Compression of color images		
52		An insight to extending these ideas to process video frames		

Literature

Book Type	Code	Title & Author	Publication Information		
			Edition	**Publisher**	**Year**
Text Book	T	Digital Image Processing – Gonzalez and Woods	3	Pearson	2008
Reference Book	R1	Digital Image Processing and Analysis – Scott E. Umbaugh	1	CRC Press	2014
	R2	Digital Image Procesing - S.Jayaraman, S.Esakkirajan, T.Veerakumar	Scilab	McGraw Hill Ed. (India Ltd.	2013
	R3	Digital Signal and Image Processing - Tamal Bose	1	John Wiley	2004

List of Subjects whose Course Information will be provided later:-
UE15CS355: Unix System Programming Laboratory
UE15CS333: Natural Language Processing
UE15CS334: High Performance Computing Architecture
UE15CS33X: Drone Computing