SRI MANAKULA VINAYAGAR
ENGINEERING COLLEGE
(An Autonomous Institution)
Puducherry – 605 107

4th - Board of Studies Meeting
in the Department of
Computer and Communication Engineering

for the Programme
B.Tech – Computer and Communication Engineering

Venue
Seminar Hall, Department of CCE
Sri ManakulaVinayagar Engineering College
Madagadipet, Puducherry – 605 107

Date & Time
28.02.2022& 2.00 pm

MINUTES OF BOARD OF STUDIES

The Fourth Board of Studies meeting for B.Tech. Computer and Communication Engineering was held on 28th February 2022 at 2:00 P.M in the Seminar Hall, Department of CCE, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS
1	**Dr. V.Bharathi** Professor and Head, Department of CCE	Chairman
2	**Dr. G. Nagarajan** Professor, Department of ECE Pondicherry Engineering College, Puducherry	Member
3	**Dr. G. Lakshmi Sutha** Professor & Head, Department of ECE, National Institute of Technology, Karaikal	Member
4	**Dr. T. T. Mirnalinee,** Professor, Department of Computer Science and Engineering, SSN College ofEngineering, Chennai	Member
5	**Porseezhian Arumugugam** Senior Engineering Manager Capgemini Engineering, Bengaluru	Member

6	**Dr. S. Premkumar** Associate Professor/ECE Sri Manakula Vinayagar Engineering College	Member
7	**Ms. V.Logisvary** Assistant Professor /ECE Sri Manakula Vinayagar Engineering College	Member
8	**Ms. T.Sivaranjani** Assistant Professor/CCE Sri Manakula Vinayagar Engineering College	Member
9	**Ms. M.Indhumathi** Assistant Professor/CCE Sri Manakula Vinayagar Engineering College	Member
10	**Ms. R.V.Nalina** Assistant Professor/CCE Sri Manakula Vinayagar Engineering College	Member
11	**Mr.M.Gopinath** Assistant Professor/CCE Sri Manakula Vinayagar Engineering College	Member
12	**Arokiaraj Christian St.Hubert** Assistant Professor /CSE Sri Manakula Vinayagar Engineering College	Member
13	**Mrs.G.Namitha** Assistant Professor /English Sri Manakula Vinayagar Engineering College	Member
14	**Mrs. S.Geetha** Assistant Professor /physics Sri Manakula Vinayagar Engineering College	Member
15	**Dr. S. Savithri** Assistant Professor /Chemistry Sri Manakula Vinayagar Engineering College	Member
16	**Ms. D.Dheebia** Assistant Professor /Mathematics Sri Manakula Vinayagar Engineering College	Member
17	**Mr.V.Suresh** Sr.Lead Engineer,Qualcom, Chennai	Member (Alumni)

AGENDA OF THE MEETING

Item No.	Particulars
BoS /2022 /UG/CCE 4.1	To review and confirm the minutes of third BoS meeting held on 28th August 2021
BoS /2022 /UG/CCE 4.2	To consider and approve syllabi of VII semester of B.Tech. CCE to be offered under Regulations 2020 for the students admitted in the academic year 2020 - 21
BoS /2022 /UG/CCE 4.3	To discuss and approve the Professional electives offered in VII semester for the students admitted in the Academic Year 2020-21 as per Regulations 2020

BoS /2022 /UG/CCE 4.4	To discuss and approve the Open electives offered in VII semester for the other department students admitted in the Academic Year 2020-21 as per Regulations 2020
BoS /2022 /UG/CCE 4.5	To discuss and approve the certification courses offered in I and III semesters for the students admitted in the Academic Year 2021-22 and 2020-21 respectively
BoS /2022 /UG/CCE 4.6	Any other items for improvement

MINUTES OF THE MEETING

Dr. V.Bharathi, Chairman, BoS initiated the meeting with a warm welcome and introduced the external members, the internal and co-opted members, and thanked them for accepting the invitation to the 4th BoS meeting. The Chairman proceeded with the presentation to deliberate on the agenda items.

BoS /2022 /UG/CCE 4.1

To review and confirm the minutes of third BoS meeting held on 28th August 2021

The second BoS Meeting for B.Tech.-Computer and Communication Engineering under regulation 2020 was held on 28-08-2021 and confirmed the following points

- Discussed and Approved Syllabi of Semester V and VI
- Discussed and Approved Syllabi of Professional Elective-II and III offered in Semester V and VI
- Discussed and Approved Syllabi of Open Elective-I for other Department students
- Discussed about certification and Skill Development Courses offered in the academic year 2020-21.

Minutes are Reviewed and Confirmed

BoS /2022 /UG/CCE 4.2

To consider and approve syllabi of VII semester of B.Tech. CCE to be offered under Regulations 2020 for the students admitted in the academic year 2020 - 21

The BoS members are discussed elaborately and reviewed the VII Semester Syllabi and suggested the following points

S.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2020	VII	Machine Learning and Artificial Intelligence (U20CCT717)	I	Suggested to change title of the unit is Introduction instead of Introduction to AI
				II	Suggested to replace R-programming in Unit-II and Data mining concepts in Unit-III with artificial intelligence learning algorithms
				III	
2	R-2020	VII	Cloud Computing and Distributed System (U20CCT718)	III	Suggested to remove Grid computing and include cloud computing topics
4	R-2020	VII	Artificial intelligence laboratory (U20CCP712)		Suggested to remove deep learning based experiments

Suggestions are considered and updated in the curriculum and syllabi of respective courses. The details are provided in Annexure-I

Approved after these minor changes and recommended to Academic Council.

To discuss and approve the Professional electives offered in VII semester for the students admitted in the Academic Year 2020-21 as per Regulations 2020

The members of the Board of Studies reviewed and discussed the syllabi for Professional Electives offered in the Seventh semester and recommended the following:

Professional Elective-IV in VII semester

S.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2020	VII	Orthogonal Frequency Division Multiplexing (U20CCE716)	-	Suggested to Change course title as "OFDM Systems" and interchange unit-I and Unit-II
				I	Suggested to modify Unit-1 title as Propagation in Wireless Channel
				IV	Suggested to include SLM and PTS topics
				V	Suggested to change Unit-V title as Signal Detection for MIMO systems
2	R-2020	VII	Social Network (U20CCE717)	-	Suggested to change course title as Social Network Analysis
3	R-2020	VII	Digital Image Processing (U20CCE719)	IV and V	Suggested to merge unit V with Unit IV and include case studies in Unit V

Suggestions are considered and updated in the syllabi of respective course.The details are provided in Annexure-II

Approved the syllabi for Professional Elective-IV offered in the VII semester with above-mentioned changes and recommended to Academic Council.

To discuss and approve the Open electives offered in VII semester for the other department students admitted in the Academic Year 2020-21 as per Regulations 2020

The BoS members reviewed syllabi of Open Elective–IV offered in the VII semester curriculum (R-2020) to other Department and suggested the following points

S.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2020	VII	Mobile Applications Development using Android (U20CCO706)	-	Suggested to include latest reference book

Suggestions are considered and updated in the syllabi of respective courses. The details are provided in Annexure-III

Approved the syllabi of Open Elective-IV offered in R-2020 to other Department with above mentioned changes and recommended to Academic Council.

BoS /2022 /UG/CCE 4.5

To discuss the skill development and certification courses in the curriculum under Regulations 2020 for B.Tech. Computer and Communication Engineering for the students admitted in the year 2020-2021 and 2021-2022

- BOS Chairman listed following Certification courses completed in the academic year 2020-21 and listed of courses planned in the academic year 2021-22 for the students admitted in 2020-21 and 2021-22

Certification Courses offered for 2020-21 admitted students

Year/Sem	Certification course Name	Course Completion status Completed/Planned	Exam Completed Yes/No
I/I	Web Programming-I	Completed	Yes
I/II	Web Programming-II	Completed	No
II/III	IoT using Python	Planned	No

Certification Courses offered for 2021-22 admitted students

Year/Sem	Certification course Name	Course Completion status Completed/Planned	Exam Completed Yes/No
I/I	Web Programming-I	Planned	No

Appreciated for certification courses offered in curriculum

BoS /2022 /UG/CCE 4.6

Any other suggestions for improvement

The Board Chairman Briefed about admission status, Induction Program and other activities carried out in the Department

The BoS Members suggested to include society oriented certification courses

Appreciated for the admission and other activities carried in the Department

The Board of Studies resolved to approve the above suggestions for B.Tech. Computer and Communication Engineering brought forward by the Chairman incorporating the above changes.The meeting was concluded at 12:30 PM with a vote of thanks by **Dr. V. Bharathi**, Head of Department, Computer and Communication Engineering.

Dr. V.Bharathi
Chairman
Professor and Head
Department of CCE, SMVEC

Dr. G. Nagarajan
Professor, Department of ECE
Pondicherry Engineering College, Puducherry

Dr. G. Lakshmi Sutha
Professor & Head, Department of ECE,
National Institute of Technology, Karaikal

Dr. T. T. Mirnalinee,
Professor, Department of Computer Science
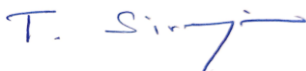and Engineering,
SSN College of   Engineering. Chennai

Porseezhian Arumugugam
Senior Engineering Manager
Capgemini Engineering, Bengaluru

Dr. S. Premkumar
Associate Professor/ECE
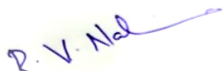
Ms. V.Logisvary
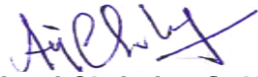Assistant Professor /ECE

Ms. T.Sivaranjani
Assistant Professor/CCE

Ms. M.Indhumathi
Assistant Professor/CCE

Ms. R.V.Nalina
Assistant Professor/CCE

Mr. M.Gopinath
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Mrs.G.Namitha
Assistant Professor /English

Mrs. S.Geetha
Assistant Professor /physics

Dr. S. Savithri
Assistant Professor /Chemistry

Ms. D.Dheebia
Assistant Professor /Chemistry

Mr.V.Suresh
Sr.Lead Engineer, Qualcom, Chennai

Revised Semester- VII Curriculum

Semester-VII

Sl. No.	Course Code	Course Title
Theory		
1	U20CCT717	Machine Learning and Artificial Intelligence
2	U20CCT718	Cloud Computing and Distributed System
3	U20CCE7XX	Professional Elective – IV#
4	U20XXO7XX	Open Elective –IV$
Practical		
5	U20HSP703	Business Basics for Entrepreneur
6	U20CCP712	Artificial Intelligence Laboratory
7	U20CCP713	Cloud Computing and Distributed System Lab
8	U20CCP714	Comprehensive Viva Voce
Project Work		
9	U20CCW701	Project Phase – I
10	U20CCW702	Internship / Inplant Training
Mandatory Course		
11	U20CCM707	Professional Ethics
Professional Elective – II (Offered in Semester V)		
1	U20CCE716	OFDM Systems
2	U20CCE717	Social Network Analysis
3	U20CCE718	Big Data Analytics
4	U20CCE719	Digital Image Processing
5	U20CCE720	Green Computing

		L	T	P	C	Hrs
U20CCT717	**MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE**	3	0	0	3	45

Course Objectives

- To Understand the basics of data science, AI and Machine learning
- To learn the essential concepts of R programming
- To know the concepts of data acquisition and processing
- To Understand the various techniques of Machine learning
- To Study the clustering concepts to apply in various application

Course Outcomes

After completion of the course, the students will be able to

CO1 – Define the basics of AI and Machine learning.**(K2)**
CO2 – Describe the essential concepts of Knowledge Inference.**(K2)**
CO3 – Infer the techniques of machine learning. .**(K2)**
CO4 – Illustrate the clustering concepts to apply in various application .**(K2)**
CO5 - Apply concepts of AI and ML in real time.**(K3)**

UNIT I INTRODUCTION   (9 Hrs)

Introduction to Artificial Intelligence - Artificial Intelligence Problems -Timelines of Artificial Intelligence -Production Systems - State Space Representation - Branches of Artificial Intelligence - Application of Artificial Intelligence.

UNIT II KNOWLEDGE INFERENCE   (9 Hrs)

Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT III TECHNIQUES OF ML   (9 Hrs)

ML Techniques overview, Validation Techniques (Cross-Validations), Feature Reduction/Dimensionality reduction, Principal components analysis (Eigen values, Eigen vectors, Orthogonality)

UNIT IV CLUSTERING   (9 Hrs)

Distance measures, Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering; Dealing with continuous, categorical values in K-Means, Constructing a hierarchical cluster , K-Medoids, k-Mode and density-based clustering ,Measures of quality of clustering

UNIT V APPLICATIONS   (9 Hrs)

AI and ML applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving

Text Books

1. Elaine Rich and Kelvin Knight, "Artificial Intelligence", Tata McGraw Hill, 3rd Edition, 2017.
2. DAN.W. Patterson, "Introduction to A.I. and Expert Systems", PHI, 2007.
3. Ameet V Joshi, "Machine Learning and Artificial Intelligence", Springer, 2020
4. Tom M Mitchell, Machine Learningǁ, First Edition, McGraw Hill Education, 2013.
5. PeterHarrington,"MachineLearninginaction",ManningPublication,2012.

Reference Books

1. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.
2. Ivan Bratko, "Prolog Programming for Artificial Intelligence", Addison-Wesley, Pearson Education, 4th Edition, 2011.

3. Andreas C.Mueller and Sarah Guido, "Introduction to Machine Learning with Python", O'ReillyMedia, Inc.First Edition, 2016.
4. Eremy Watt, RezaBorhani, and AggelosK. Katsaggelos, "Machine Learning Refined Foundations, Algorithms, and Applications", Cambridge University Press, 2016.
5. Shai Shalev-Shwartzand Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms",CambridgeUniversity Press, 2014.
6. Mehryar Mohri, Afshin Rostamizadeh, AmeetTalwalkar, "Foundations of Machine Learning", MIT Press, Second Edition,2012.

Web References

1. https://www.google.co.in/books/edition/The_R_Book/8D4HVx0apZQC?hl=en&gbpv=1&dq=ESSENTIALS+OF +R+PROGRAMMING&printsec=frontcover
2. https://www.tutorialspoint.com/r/index.htm
3. https://doi.org/10.1007/978-3-030-26622-6
4. https://www.coursera.org/learn/machine-learning
5. https://machinelearningmastery.com/a-tour-of-machine-learning-algorithms/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	2	-	2	1	1	-	2	3	2	2	3	1	2
2	3	2	2	2	3	1	1	-	2	3	2	2	3	1	2
3	3	2	2	2	3	1	1	-	2	3	2	2	3	1	2
4	3	2	2	2	3	1	1	-	2	3	2	2	3	1	2
5	3	2	2	2	3	1	1	-	2	3	2	2	3	1	2

Correlation Level: 1-Low, 2-Medium, 3- High

U20CCT718	CLOUD COMPUTING AND DISTRIBUTED SYSTEM	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
- To understand how modern clouds operate and different role of services.
- To understand about cluster computing operation, different types and their performance.
- To know about architecture of parallel and grid computing with distributed technologies.
- To acquire the knowledge about various distributed systems and network virtualization.
- To get idea about distributed file accessing models and file system.

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

CO1 - Describe the basic introduction and various services under by cloud computing **(K2)**
CO2 – Analyze the performances of cluster computing on different models **(K3)**
CO3 – Describe about architecture on parallel and grid computing and their relation **(K2)**
CO4 - Explain the basic concepts of distributed systems and analysis on network virtualization **(K2)**
CO5 - Design and study the operations of file system analysis **(K3)**

UNIT I CLOUD COMPUTING   (9 Hrs)
Evolution of cloud computing, Comparison with traditional computing architecture (client/server), Services provided at various levels, Role of Networks in Cloud computing, Role of Web services; Service Models (SaaS): Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS); Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud, Cloud Security.

UNIT II CLUSTER AND PARALLEL COMPUTING   (9 Hrs)
Cluster setup and its Administration, Performance Models & Simulations; Networking, Distributed shared memory, parallel I/O Clusters, Scheduling parallel jobs on clusters, Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing, Cluster System – Beowulf, COMPaS and NanOS.

Parallel Computing: Flynn's Classification of Computer Architecture, Types of Parallelism, Parallel programming models.

UNIT III CLOUD SOFTWARE AND COMPUTING PLATFORMS   (9 Hrs)

HDFS – Map Reduce – Google App Engine (GAE) – Programming Environment for GAE – Architecture of GFS – Case Studies: Openstack, Heroku, and Docker Containers –Amazon EC2, AWS, Microsoft Azure, Google Compute Engine.

UNIT IV DISTRIBUTED SYSTEMS   (9 Hrs)
Introduction, Characteristics, Issues, Goals, and Types of distributed systems, Distributed System Models, Hardware concepts, Software Concept, Middleware: Models of Middleware, Services offered by middleware, Client Server model. Layered Protocols, Interprocess communication (IPC): MPI, Remote Procedure Call (RPC), Remote Object Invocation, Remote Method Invocation (RMI), Message Oriented Communication, Stream Oriented Communication, Group Communication.

UNIT V DISTRIBUTED FILE SYSTEMS AND NAME SERVICES   (9 Hrs)

Introduction and features of DFS, File models, File Accessing models, File-Caching Schemes, File Replication, Case Study: Distributed File Systems (DSF), Network File System (NFS), Andrew File System (AFS), Introduction to Name services and Domain Name System, Directory Services, Case Study: The Global Name Service, The X.500 Directory Service, Designing Distributed Systems: Google Case Study.

Text Books

1. Malhar Barai, Vincenzo Caselli, Binildas A. Christudas , "Service Oriented Architecture With Java", Packt Publishing, 2008.
2. Qusay H. Mahmoud , "Distributed Programming with Java" , Manning Publisher 2000.
3. Barrie Sosinsky, "Cloud Computing Bible", Wiley-India, 2010.

Reference Books

1. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed System: Principles & Paradigms, Prentice Hall, 2007
2. George Couluris, Jean Dollimore, "Distributed Systems Concepts & Design", Pearson education, 3rd edition, 2006.
3. N.A. Lynch: Distributed Algorithms, Morgan Kayfmann Publishing Inc., CA, 1996.
4. Thomas Erl, Zaigham Mahood& Ricardo Puttini, "Cloud Computing, Concept, Technology & Architecture", Prentice Hall, SecondEdition,2013.
5. Kai Hwang. Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing from parallel processing to the internet of things", Elsevier, 2012.

Web References

1. https://www.cl.cam.ac.uk/teaching/1819/CloudComp/materials.html
2. https://www.geektonight.com/cloud-computing-notes/
3. https://studentsfocus.com/cs8791-cc-notes-cloud-computing-notes-csc-7th-sem/
4. http://www.facweb.iitkgp.ac.in/~shamik/spring2013/cc/cc2013_dtls.html

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	2	-	2	1	1	-	2	3	2	2	3	2	1
2	3	2	2	2	3	1	1	-	2	3	2	2	3	2	1
3	3	2	2	2	3	1	1	-	2	3	2	2	3	2	1
4	3	2	2	2	3	1	1	-	2	3	2	2	3	2	1
5	3	2	2	2	3	1	1	-	2	3	2	2	3	2	1

Correlation Level: 1-Low, 2-Medium, 3- High

	L	**T**	**P**	**C**	**Hrs**
U20CCP712 **ARTIFICIAL INTELLIGENCE LABORATORY**	0	0	3	3	45

Course Objectives

- To Illustrate a problem and build intelligent agents
- To learn appropriate searching techniques to solve a real world problem
- To analyze the problem and infer new knowledge using suitable knowledge representation schemes
- To Develop planning and apply learning algorithms on real world problems
- To Design an expert system and implement natural language processing techniques

Course Outcomes

After completion of the course, the students will be able to

CO1 – Formulate a problem and build intelligent agents.**(K3)**

CO2 – Apply appropriate searching techniques to solve a real world problem. **(K3)**

CO3 – Analyze the problem and infer new knowledge using suitable knowledge representation Schemes. **(K3)**

CO4 - Develop planning and apply learning algorithms on real world problems. **(K3)**

CO5- Design an expert system and implement natural language processing techniques. **(K3)**

LIST OF EXPERIMENTS

1. Implementation of toy problems
2. Developing agent programs for real world problems
3. Implementation of constraint satisfaction problems
4. Implementation and Analysis of DFS and BFS for an application
5. Developing Best first search and A* Algorithm for real world problems
6. Implementation of mini max algorithm for an application
7. Implementation of unification and resolution for real world problems.
8. Implementation of knowledge representation schemes - use cases
9. Implementation of block world problem
10. Implementation of learning algorithms for an application
11. Development of ensemble model for an application
12. Implementation of NLP programs

Reference Books

1. PrateekJoshi, "Artificial IntelligencewithPhython",1sted.,PacktPublishing,2017
2. DenisRothman, "Artificial IntelligencebyExample",Packt,2018
3. ParagKulkarni, Prachi Joshi, "Artificial Intelligence –Building Intelligent Systems," 1st ed., PHI learning,2015
4. Deepak Kemhani,"FirstcourseinArtificial Intelligence",McGrawHillPvtLtd,2013
5. Stuart J. Russell, Peter Norwig , Artificial Intelligence –A Modern approach, 3rd Pearson Education, 2016

Web References
1. https://www.AI&ML.com
2. https://onlinelibrary.wiley.com/doi/full/10.1002/inf2.12016
3. https://nptel.ac.in/courses/117/106/117106091/
4. https://www.tutorialspoint.com/artificial_intelligence/index.html

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1	2	1	2	-	2	1	1	-	2	3	2	2	3	2	-
2	3	2	2	2	3	1	1	-	2	3	2	2	3	2	-
3	3	2	2	2	3	1	1	-	2	3	2	2	3	2	-
4	3	2	2	2	3	1	1	-	2	3	2	2	3	2	-
5	3	2	2	2	3	1	1	-	2	3	2	2	3	2	-

Correlation Level: 1-Low, 2-Medium, 3- High

	L	**T**	**P**	**C**	**Hrs**

U20CCE716   **OFDM SYSTEMS**   L T P C Hrs
                                    3 0 0 3 45

Course Objective
- To develop mathematical theory of digital communications over fading channels
- To learn multicarrier techniques for fading wireless channels
- To analyze and design of multi-channel techniques for communication
- To understand the synchronization issues in multicarrier environment
- To understand multiplexed MIMO systems

Course Outcomes
After completion of the course, the students are able to
CO1 – Describe basic principles of OFDM. **(K2)**
CO2 - Explain the fundamental concepts of wireless channel modelling techniques.**(K2)**
CO3 – Illustrate the performance of multicarrier system in wireless cellular systems **(K2)**
CO4 - Demonstrate the concepts of channel estimation in fading channels **(K2)**
CO5 - Design spatially multiplexed MIMO systems **(K3)**

UNIT –I INTRODUCTION **(9 Hrs)**

Introduction-High Rate Wireless Applications -Single-Carrier vs. Multi-Carrier Transmission - Introduction to OFDM -Basic Principle of OFDM -Modelling of OFDM for Time-Varying Random Channel-Appropriate Channel Model for OFDM Systems -Impairments of Wireless Channels to OFDM Signals -Application to Millimeter-Wave Radio Channels.

UNIT –II PROPAGATION IN WIRELESS CHANNEL **(9 Hrs)**

Large-Scale Fading, Small-Scale Fading; SISO Channel Models - Indoor Channel Models and Outdoor Channel Models; MIMO Channel Models-Statistical MIMO Model, I-METRA MIMO Channel Model, SCM MIMO Channel Model.

UNIT –III OPTIMIZATION AND SYNCHRONIZATION **(9 Hrs)**

Coded OFDM-Multiple Access Extensions of OFDM–Multiband OFDM-MIMO OFDM -Performance Optimization - Channel Partitioning -Synchronization -Timing Offset Estimation -Frequency Offset Estimation -Synchronization in Cellular Systems

UNIT –IV CHANNEL ESTIMATION **(9 Hrs)**

Channel Estimation -Pilot Structure -Training Symbol-Based Channel Estimation -DFT-Based Channel Estimation – Decision-Directed Channel Estimation -PAPR Reduction-Inter-Cell Interference Mitigation Techniques.

UNIT –V SIGNAL DETECTION FOR MIMO SYSTEMS **(9 Hrs)**

Managing Trust in online social network Security and Privacy in online social network security Linear Signal Detection -ZF Signal Detection, MMSE Signal Detection, OSIC Signal Detection , ML Signal Detection, Sphere Decoding Method, QRM-MLD Method, Lattice Reduction-Aided Detection, Lenstra-Lenstra-Lovasz (LLL) Algorithm, Application of Lattice Reduction, Soft Decision for MIMO Systems, Log-Likelihood-Ratio (LLR) for SISO Systems, LLR for Linear Detector-Based MIMO System, LLR for MIMO System with a Candidate Vector Set, LLR for MIMO System Using a Limited.

Text Books

1. Ye (Geoffrey) Li and Gordon L. Stuber, "Orthogonal Frequency Division Multiplexing for Wireless Communications", Springer, 2006.
2. Ramjee Prasad, "OFDM for Wireless Communications Systems", Artech House, 2004.
3. Tao Jiang, Lingyang,Yan Zhang, "Orthogonal Frequency Division Multiple Access fundamentals and applications", CRC Press, Taylor and Francis Group LLC,2010
4. Y.J.Liu, Introduction to OFDM Receiver Design and Simulation, Artech House,2019.

Reference Books

1. Yong Soo Cho, Jaekwon Kim, "MIMO-OFDM Wireless Communications with Matlab" John Wiley and Sons, 2010.
2. Claude Oestges ,"MIMO Wireless Communications", 2e, Prentice Hall, 2010.
3. EzioBiglieri, RobertCalderbank, "MIMO Wireless Communications" Cambridge University Press 2007.
4. Bahai, Saltzberg and Ergen, Multi-Carrier,"Digital Communications, Theory and Applications of OFDM", Second Edition, Springer, 2004.
5. Henrik Schulze and Christian Lueders, "Theory and Applications of OFDM and CDMA Wideband Wireless Communications", John Wiley and Sons, 2005.

Web References

1. https://nptel.ac.in/courses/117/104/117104115/
2. https://nptel.ac.in/courses/117/104/117104118/
3. https://tinyurl.com/ya39mdu9

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1	2	1	2	1	2	1	1	-	1	1	1	2	3	2	-
2	3	2	2	1	3	1	1	-	1	1	1	2	3	2	-
3	3	2	2	1	3	1	1	-	1	1	1	2	3	2	-
4	3	2	2	1	3	1	1	-	1	1	1	2	3	2	-
5	3	2	2	1	3	1	1	-	1	1	1	2	3	2	-

Correlation Level: 1-Low, 2-Medium, 3- High

	L	T	P	C	Hrs
U20CCE717 SOCIAL NETWORK ANALYSIS	3	0	0	3	45

Course Objectives

- Understand the components of social networks
- Model and visualize social networks
- To mine the users in the social network
- Understand evolution of social networks
- To know the applications in real time systems

Course Outcomes

After completion of the course, the students are able to

CO1 - Illustrate the basic components of social networks.(**K2**)
CO2 – Apply the different models, measurements and metrics of social networks.(**K3**)
CO3 - Represent knowledge using ontology.(**K3**)
CO4- Describe evolution of social networks.(**K2**)
CO5 – Use the security features in social and information networks for various practical applications(**K3**)

UNIT I INTRODUCTION   (9 Hrs)

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks.

UNIT II MODELING AND VISUALIZATION   (9 Hrs)

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix- Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications – Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships.

UNIT III MINING COMMUNITIES   (9 Hrs)

Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification   in   Social   Networks.

UNIT IV EVOLUTION   (9 Hrs)

Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence - Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks - Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction – Bayesian Probabilistic Models - Probabilistic Relational Models.

UNIT V APPLICATIONS   (9 Hrs)

A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection

Text Books

1. Stanley Wasserman, Katherine Faust, "Social network analysis: Methods and applications", Cambridge university press, 2009.
2. John Scott, "Social network analysis", 3rd edition, SAGE, 2013.

3. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.
4. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010

Reference Books

1. Charu Aggarwal, Social "Network data analysis", Springer, 2011.
2. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world" Cambridge University Press, 2010.
3. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
4. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
5. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.

Web References
1. https://nptel.ac.in/courses/106/106/106106169/
2. https://github.com/GokulKarthik/nptel-social-networks
3. https://github.com/PunithKumarMR/Social-Networks-NPTEL

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	2	1	2	1	1	-	1	1	2	2	3	3	1
2	3	2	2	1	3	1	1	-	1	1	2	2	3	3	1
3	3	2	2	1	3	1	1	-	1	1	2	2	3	3	1
4	3	2	2	1	3	1	1	-	1	1	2	2	3	3	1
5	3	2	2	1	3	1	1	-	1	1	2	2	3	3	1

Correlation Level: 1-Low, 2-Medium, 3- High

U20CCE719	**DIGITAL IMAGE PROCESSING**	**L**	**T**	**P**	**C**	**Hrs**
		3	**0**	**0**	**3**	**45**

Course Objectives
- To Understanding of standard advanced image processing algorithms.
- To Understanding of image processing system development.
- To Understanding of team design techniques
- To Experience in algorithm development and testing
- To learn the concept of basic morphological algorithms

Course Outcomes
After completion of the course, the students will be able to
CO1 - Apply transforms like DFT, Haar, KL, Wavelet and DCT on digital images**(K3)**
CO2 - Design frequency domain filters and spatial filters for image enhancement**(K3)**
CO3 - Identify the image degradation models which includes linear, position-invariant **(K3)**
CO4- Analyse the methodologies for image Segmentation and morphological algorithms **(K4)**
CO5 – Apply image processing algorithms in real time problems **(K3)**

UNIT I IMAGE ANALYSIS AND IMAGE TRANSFORMS (9 Hrs)
Components of an image processing system - image representation – grey scale and colour images – Basic relationship between pixels- image sampling and quantization – two dimensional orthogonal transforms - DFT, FFT, Haar transform, KLT, DCT, wavelets

UNIT II IMAGE ENHANCEMENT (9 Hrs)
Image enhancement in the Spatial Domain - background – basic grey level transformations – histogram processing – enhancement using arithmetic/logic operations – basic of spatial filtering – smoothing spatial filters – sharpening spatial filters – combining spatial enhancement methods – image enhancement in the frequency domain - background – introduction to Fourier transform and frequency domain – smoothing frequency domain filters – sharpening frequency domain filters – homomorphic filters – implementation

UNIT III IMAGE RESTORATION (9 Hrs)
Model of the image degradation process – noise models – restoration in the presence of noise - periodic noise reduction by frequency domain filtering – Linear, position invariant degradation – estimating the degrading function – inverse filtering – minimum mean square error filtering – constrained least square filtering – geometric mean filter – geometric transformations

UNIT IV IMAGE SEGMENTATION AND MORPHOLOGICAL PROCESSING (9 Hrs)
Detection of discontinuities – edge linking and boundary detection – threshold – region based segmentation – segmentation by morphological watersheds – use of motion in segmentation - Preliminaries – dilation and erosion – opening and closing – hit-or-miss transformation – some basic morphological algorithms – extension to grey scale images – boundary descriptors – regional descriptors – use of principal components for description – relational descriptors Object Recognition.

UNIT V CASE STUDIES (9 Hrs)
Industrial applications of image processing, patterns classification, Digital Image Processing in Medical Applications, Impulse Noise Reduction Using Morphological image Processing with structuring Elements-case studies.

Text Books
1. Rafael C. Gonzalez, Richard E. Woods - Digital Image Processing – Pearson, India – 2016(3rd Edition)
2. Digital Image Processing and Analysis: Application with MATLAB and CVIPtools, 3rd Edition, SE Umbaugh, Taylor&Francis/CRC Press, 2018.

3. Pratt W.K, —Digital Image Processing‖, 3rd ed., John Wiley & Sons, 2007

Reference Books

1. Anil. K. Jain - Fundamentals of Digital Image Processing – Pearson, India – 2015(1st Edition)
2. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.
3. S. Jayarman, S. Esakkirajan, T. Veerakumar, "Digital Image Processing", Tata McGraw Hill, 2010.
4. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", 2nd Edition, Thomson, 2007.
5. William K. Pratt – Digital Image Processing – John Wiley & Sons-2/e, 2004.

Web References

1. htthttp://www.caen.uiowa.edu/~dip/LECTURE/lecture.html
2. http://eeweb.poly.edu/~onur/lectures/lectures.html.
3. Related journal and conference publications.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	1	2	1	1	-	1	1	1	1	3	-	3
2	3	2	2	1	3	1	1	-	1	1	1	1	3	-	3
3	3	2	2	1	3	1	1	-	1	1	1	1	3	-	3
4	3	2	2	1	3	1	1	-	1	1	1	1	3	-	3
5	3	2	2	1	3	1	1	-	1	1	1	1	3	-	3

Correlation Level: 1-Low, 2-Medium, 3- High