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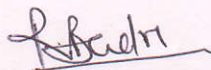
Academy of
Engineering

MIT ACADEMY OF ENGINEERING, ALANDI
Savitribai Phule Pune University

Curriculum for
Master of Technology in

Computer Engineering
(Choice Based Credit System)

2016-2020



BoS Chairman
Dean, School of
Computer Engineering
& Technology



Member Secretary
Academic Council
Dean Academics



Chairman
Academic Council
Director MITAOE



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

**Curriculum for
First Year
Master of Technology**

2016-2020

(With Effect from Academic Year: 2016-2017)

DEPARTMENT OF COMPUTER ENGG.

W.E.F

:

2016-17

FY MTECH

RELEASE DATE

:

1/08/2016

REVISION NO.

:

0.0

TRIMISTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	PC1	AS501	Computing and Mathematics	2	2	4
2.	PC2	CS501	Management System	2	2	4
3.	PC3	CS502	Modern Technologies	2	2	4
TOTAL				6	6	12

TRIMISTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	EX501	Research Methodology	2	--	2
2.	DC1	CS511	Machine Learning-I	3	2	4
3.	DC2	CS512	Internet of Things: Design	3	2	4
TOTAL				8	4	10

TRIMISTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC5	EX502	Technical Writing	2	--	2
2.	DC3	CS521	Machine Learning-II	3	2	4
3.	DC4	CS522	Internet of Things: Applications	3	2	4
4.	SDP1	CS523	Project Work - I	--	4	2
TOTAL				8	8	12

Note: L: Lecture, P: Practical

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2016-17	
FY MTECH		COURSE NAME	:	Computing and Mathematics	
		COURSE CODE	:	AS501	
		COURSE CREDITS	:	04	
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution. AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product. AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem. AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product. AS501.co.3: Understand the physical situation, identify the accurate mathematical model and

solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context

THEORY:

Computational Methods to Ordinary Differential Equations: Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method and Multi step Methods- Explicit Adams-Bashforth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method.

Statistics and Quality Control: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Regression lines. Control Charts for Process Location: \bar{X} Chart, Control Charts for Process Variation: S Chart, R charts.

PRACTICAL:

Practical No. 1	Title: First Degree Differential equation	2 Hours
Introduction to first order first degree Differential equation and its actual solution		
Practical No. 2	Title: Differential equation methods	2 Hours
Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method.		
Practical No. 3	Title: Differential equation Methods	2 Hours
Adams-Bashforth technique and Implicit Adams-Moulton techniques.		
Practical No. 4	Title: Differential equation Methods	2 Hours
Adaptive RK Method Embedded RK Method, Shooting Method.		
Practical No. 5	Title: Simplex method Feasible solution	2 Hours
Solution of system of equations using simplex method (Feasible solution).		
Practical No. 6	Title: simplex method (Feasible to basic feasible solution).	2 Hours
Solution of system of equations using simplex method (Feasible to basic feasible solution).		
Practical No. 7	Title: Transportation problem	2 Hours
Transportation problem: North-West corner method, Least-cost method.		
Practical No. 8	Title: Vogel's approximation method	2 Hours
Transportation problem: Vogel's approximation method.		

Practical No. 9	Title: Central Tendency of data, Variance, Standard Deviation	2 Hours
Central Tendency of data, Variance, Standard Deviation.		
Practical No. 10	Title: Moments, Correlation, Coefficient of Correlation	2 Hours
Moments, Correlation, Coefficient of Correlation.		
Practical No. 11	Title: Regression Lines.	2 Hours
Regression Lines.		
Practical No. 12	Title: Charts	2 Hours
\bar{X} Chart, S Chart, R chart		

TEXT BOOKS:

1. Numerical Methods for Engineers by Steven C. Chapra & Raymond P. Canale, sixth edition, ISBN 978-0-07-340106-5, MHID 0-07-340106-4.
2. Operations Research by Kanti Swarup, P.K. Gupta, Man Mohan, ISBN: 81-8054-226-2.
3. Statistical Methods Vol. 2 by Das, ISBN: 9780070263512.

REFERENCES:

1. Numerical Methods by V.N. Vedamurthy & N.Ch.S.N. Iyenger, First edition, ISBN: 9788125906308.
2. Operations Research by S.D. Sharma.
3. Statistical Methods Vol. 1 by Das, ISBN: 9780070263505.
4. Introduction to Probability and Statistics by Milton, ISBN: 9780070636941.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2016-17	
FY MTECH		COURSE NAME	:	Management System	
		COURSE CODE	:	CS501	
		COURSE CREDITS	:	04	
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> CS501.CEO.1: To enable M.Tech Students in efficiently and effectively discharging any business related roles, which they may be assigned, after successful completion of their Post- Graduation from MITAOE. CS501.CEO.2: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> CS501.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems. CS501.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement CS501.CO.3: Draw a model of power structure and critically analyse with a view to improving it for achieving greater heights in objectives

4. CS501.CO.4: Identify and describe potential problem areas and advise proactive measures to install efficient measures.
5. CS501.CO.5: Identify Key Result Areas (KRAs), new area of growths, draw plans to achieve, implement them and provide effective leadership in the process, creating conducive environment in the organization

THEORY:

Concept of Systems; Concept of Business; Concept of Management; Concept of Learning and its mapping with Bloom's Taxonomy.

Nature and Process Management with an Input-Output Model, seen in scenarios of different aspects of social life.

Role of a Business Firm as a national economic entity with understanding of Macro, Micro and International economics. An understanding of products and services, circular model of flow of money, products and services in a society.

Essentials of Business Management, functioning and growth of a Business Unit with understanding of Break-Even Analysis, Abell's Three Dimensional model of business growth, various business functions in an organization and changing focus from production oriented business to customer orientation and value co-creation.

Various Schools of Thought on Management based on changing concepts of economics and evolution of Business Strategy. Need to understand innovative ways to evolve a new suitable management system for an organization with special focus on new Strategies at the bottom of the pyramid, quality as strategy, disruptive innovation and diffusion of technology.

Decision making, as an essence of management. Concept of Games Theory and its use in decision making.

Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT).

Utilization of concepts of commanding, directing, managing and leading towards effective management of an organization. Skillful use of Emotional Intelligence in conflict management. Techniques for Self Management and Stress Management for improving personal efficiency and effectivity.

Growing significance of Human Relations, with use of Virtual and Informal Organizations and use of Social Media for management of emerging organizations with preponderance of knowledge workers and growing use of robotics and Artificial Intelligence. Process of evolving a Training needs in an organization and methodology for their fulfillment.

Concepts of Invention Innovation, Entrepreneurship and Technology Management for induction of new products in market. Business startups and growth in current Indian Environment. Presentation on Entrepreneurial plans

PRACTICAL:

Practical No. 1	Title: Corporate management case presentation	4 Hours
A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks)		

Practical No. 2	Title: Entrepreneurial Business Plan presentation	4 Hours
Preparation and submission of an innovative and entrepreneurial Business Plan of student's own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks)		

TEXT BOOKS:

1. Management – A Global and Entrepreneurial Perspective; Harold Koontz, Heinz Weihrich and Mark V Cannice, Tata McGraw Hill Publications, 12th Edition, 2008.
2. Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dots; Vachaspati Mishra; Himalaya Publishing House, First Edition, 2016.

REFERENCES:

1. Dr A Sivathanu Pillai; Technology Leadership – A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2016-17	
FY MTECH		COURSE NAME	:	Modern Technologies	
		COURSE CODE	:	CS502	
		COURSE CREDITS	:	04	
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> 1. CS502.CEO.1: To get familiar with big data, wireless sensor networks and Internet of Things technology. 2. CS502.CEO.2: To acquire the knowledge of geometrical transformation and grasp the animation techniques. 3. CS502.CEO.3: Study basic principles of nano car and different modern technologies 4. CS502.CEO.4: Apply their knowledge to understand different statistical tools and analysis software.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. CS502.CO.1: Understand the knowledge of advanced software's. 2. CS502.CO.2: Apply their knowledge in different fields. 3. CS502.CO.3: Apply advance technologies in automobile industry.
THEORY:

Big Data: Big Data, Hadoop Distributed File System, Network: Types of Networks, Internet Architecture, Wired and Wireless MAC, RFID, Internet of Things, IoT Applications, R Programming.

2D and 3D Geometrical Transformations: Scaling, Translation, Rotation, Reflection, Viewing Transformations: Parallel and Perspective Projection, Curves and Surfaces: Cubic Splines, Bezier Curves, B-Splines, Animation Technology – OpenGL, Maya, Blender.

Advance technologies: Nano Car Air velocity, Air conditioning system, Different modern energy storage devices, Modern evacuated tube technologies, Advanced Sensor technology, recent photovoltaic technology, Controlling of thermal power plants and its instrumentation, Agricultural robot, Closed ecological systems, Artificial photosynthesis, Energy harvesting.

Modern statistical tools like MATLAB, SPSS, etc., Mathematical Modeling, Data interpretation technologies like ANOVA, Introduction of Analysis software's like ANSYS, Star CD, etc., ERP system, SCADA, PLC System, Electronic Control Unit (ECU), Sources of Energy storage, fuel efficient engine through closed loop control system. Advances in Electronic Cooling Equipments. Bio-medical devices, their Applications, FDA approval procedures, A Certification.

Advances in automotive electronics: Night vision systems, Driver alertness monitoring, Event data recorders (automotive black boxes), Accident recorders, Adaptive cruise control systems, Autonomous emergency breaking systems, Electronic throttle control, On-Board diagnostics systems, Blind spot detection, Navigation systems, Communication systems, Engine control

PRACTICAL:

Practical No. 1	Title: Animation Technologies	2 Hours
Case study on Animation Technologies		
Practical No. 2	Title: Wireless Sensor Application	2 Hours
Case study on Wireless Sensor Application.		
Practical No. 3	Title: Internet of Things	4 Hours
Case study on IoT (Smart City, Healthcare, Agriculture).		
Practical No. 4	Title: Hadoop	4 Hours
Case study on Big Data – Hadoop Configuration.		
Practical No. 5	Title: Data interpretation	2 Hours
Case study on Data interpretation technologies.		
Practical No. 6	Title: Agricultural robot	2 Hours
Case study on Agricultural robot.		
Practical No. 7	Title: Electronic cooling equipments.	2 Hours

Case study on Electronic cooling equipments.

Practical No. 8

Title: Adaptive cruise control system

2 Hours

Case study on Adaptive cruise control system

TEXT BOOKS:

1. S. Harrington, S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.
2. Anthony F. Collings , Christa Critchley,"Artificial Photosynthesis: From Basic Biology to Industrial Application." 2014, ISBN: 978-3-527-31090-6.
3. NasimulAlam Syed, Sanjib Islam, Saroj Kumar Patel, "Advanced Guide to MATLAB: Practical Examples in Science and Engineering" I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
4. William B. Ribbens, Ph.D., Norman P. Mansour, Gerald Luecke, Charles W. Battle, Edward C. Jones and Leslie E. Mansir, "Understanding Automotive Electronics", ISBN: 978-0-7506-7599-4.
5. Bosch Automotive Electrics and Automotive Electronics: Systems and edited by Robert Bosch GmbH, Springer science and digital media,ISBN-13: 978-3658017835, 2013.

REFERENCES:

1. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. Robert Faludi, "Building Wireless Sensor Network" 2nd Edition, OReilly Publication, 2010.
3. Donald Norris, " The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw-Hill Education, ISBN-13: 978-0071835206, 2015.
4. MadhuJagadeesh, SoumendraMohanty, HarshaSrivatsa, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", 1st Edition, Apress,ISBN-13: 978-1430248729, 2013.
5. NihalKulratna, "Energy storage devices for electronics system", ISBN: 978-0-12-407947-2, 2015.
6. Ralph Remsburg, Advanced thermal design for electronics equipment, International Thomson Publishing Thomson Science, (ISBN: 978-1-4613-4633-3).
7. AsierPerallos, Unai Hernandez-Jayo, Enrique Onieva, Ignacio Julio GarcaZuazola, John Wiley and sons, "Intelligent Transport Systems: Technologies and Applications", ISBN: 978-1-118-89478-1, 2015.
8. GalipUlsoy, Huei Peng, MelihÇakmakci, "Automotive Control Systems", Cambridge 2012.
9. JayavardhanaGubbi, RajkumarBuyya "Internet of Things (IoT): A Vision, architectural elements and future directions", Elsevier Journal on Future Generation Computer Systems, 29, pages 1645-1660, 2013.
10. Madden, Sam. "From databases to big data", Article, IEEE, Internet Computing, IEEE 16.3 (2012): 4-6, <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6188576>.
11. Daryl Oster, Masayuki Kumada, Yaoping Zhang, "Evacuated tube transport technologies (ET3) tm: a maximum value global transportation network for passengers and cargo." 2013, Journal of Modern Transportation, ISSN: 2196-0577.
12. Ali Bahrami, Shahram Mohammadnejad, Saeede Soleimaninezhad "Photovoltaic cells technology:

principles and recent developments”, Springer US, Online ISSN: 1572-817X, 2012.

13. Martin Kaiser, “Electronic control unit (ECU)”, Springer US, Online ISBN 978-3-658-03964-6, pages 254-259, 2015.
14. Pritpal Singh, Tanjot Sethi, Bunil Kumar Balabantaray, Bibhuti Bhushan Biswal, “Advanced vehicle security system”, IEEE, International Conference on “Innovations in Information, Embedded and Communication Systems (ICIIECS)”, pages 1-6, 2015.
15. Hermann Kopetz, Stephan Poledna, “Autonomous Emergency Braking: A System-of-Systems perspective”, IEEE, Conference on “Dependable Systems and Networks Workshop (DSN-W)”, 43rd Annual IEEE/IFIP, pages 1-7, 2013.

DEPARTMENT OF COMPUTER ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Research Methodology
			COURSE CODE	:	EX501
			COURSE CREDITS	:	02
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. AS501 – Computing and Mathematics

COURSE OBJECTIVES:

1. EX501.CEO.1: To develop understanding of the basic framework of research process.
2. EX501.CEO.2: To develop an understanding of various research designs and techniques.
3. EX501.CEO.3: To identify various sources of information for literature review and data collection.
4. EX501.CEO.4: To develop an understanding of the ethical dimensions of conducting applied research.
5. EX501.CEO.5: Appreciate the components of scholarly writing and evaluate its quality.

COURSE OUTCOMES:

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

1. EX501.CO.1: Understand the objective & paradigm for the research
2. EX501.CO.2: Establish & validate the results & analysis
3. EX501.CO.3: Understand the ethical issues concerning the participation & data collection
4. EX501.CO.4: Individually write research proposal

THEORY:

Research – Introduction: What is research, Research definition, Objective & paradigm for the research, Identifying & defining the research problem, Literature & its analysis, Qualitative & quantitative research, development of theoretical and conceptual frame work. Ethical Issues concerning research participants, Ethical issues in data collection, Data collection methods

Hypothesis, Data processing: Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques.

Statistics in research: Multivariate analysis, Concept of regression, Establishing validity and reliability of the result, Principal component analysis, variance & covariance- ANOVA, ANOCOVA.

Writing research proposal : Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing

TEXT BOOKS:

1. John W. Creswell, "Research Design-Qualitative & Quantitative Approaches", SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. Ranjit Kumar, "Research Methodology- A Step by Step Guide for Beginners", 2nd ed., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
3. Bernard M. Moret, "The Theory of Computation", Pearson Publication ISBN: 978-81-317-0870-5

REFERENCES:

1. C. R. Kothari, "Research Methodology, Methods & Techniques", 2nd Edition, New Age International Publication ISBN: 978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", 8th Edition, Pearson Publication ISBN: 978-81-317-1104-0
3. Wilson, Shawn, "What is indigenous research methodology?", Canadian Journal of Native Education; 2001; 25, 2; ProQuest Central, pp. 175

DEPARTMENT OF COMPUTER ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Machine Learning - I
			COURSE CODE	:	CS 511
			COURSE CREDITS	:	04
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> 1. CS511.CEO.1: To provide knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence. 2. CS511.CEO.2: To introduce modern techniques in machine learning, and a practical knowledge of algorithms and methods. 3. CS511.CEO.3: To recognize the characteristics of machine learning to apply on various real-world applications. 4. CS511.CEO.4: To be familiar with the use machine learning ideas, paradigms and techniques with its performance evaluation.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. CS511.CO.1: Understand and differentiate modern machine learning techniques and applications 2. CS511.CO.2: Identify potential application and apply existing models and algorithms 3. CS511.CO.3: Analyze appropriate method based on the particular characteristics of the domains and applications under consideration. 4. CS511.CO.4: Accurately evaluate the performance of algorithms, as well as formulate and test

hypotheses.

THEORY:

Introduction: Linear algebra, probability and random process, Python programming, Machine Learning and Examples of Applications, Learning Associations, Classification, Regression, Unsupervised Learning, SVM **Supervised Learning** : Learning a Class from Examples, Noise Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm, Bayesian Decision Theory, Classification, Losses and Risks, Utility Theory, Association Rules, **Case Studies:** A simple binary classification problem, Financial Forecasting,

Parametric Method : Maximum Likelihood Estimation, Evaluating an Estimator The Bayes' Estimator, Parametric Classification, Regression, **Multivariate Methods:** Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Dimensionality Reduction, Subset Selection, Principal Components Analysis, Feature Embedding, Factor Analysis, Association Analysis **Clustering:** Introduction K-Means Clustering, **Application:** Image segmentation using clustering. eClustering for Medical Image Processing.

Non-parametric method : Nonparametric Density Estimation, Histogram Estimator, Kernel Estimator, K-Nearest Neighbor Estimator, Generalization to Multivariate Data, Nonparametric Classification, Condensed Nearest Neighbor, Nonparametric Regression **Decision Trees:** Classification and Regression Trees, Pruning, Rule Extraction **Multilayer Perceptron's:** Introduction, Perceptron, Training a Perceptron, Learning Boolean Functions, Multilayer Perceptron's, Backpropagation Algorithm, training procedure **Applications:** Weather Forecasting, Rain Forecasting, Times Series Prediction.

PRACTICAL:

Practical No. 1	Title:	2 Hours
Design & Implement simple binary classification problem		
Practical No. 2	Title:	2 Hours
Design & Implement Image Segmentation using clustering.		
Practical No. 3	Title:	2 Hours
Design & Implement Weather Forecasting		
Practical No. 4	Title:	2 Hours
Design & Implementation of Rain Forecasting		
Practical No. 5	Title:	2 Hours
Study of Clustering for Medical Image Processing.		
Practical No. 6	Title:	2 Hours
Study of Time series Prediction		

TEXT BOOKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", Third Edition, The MIT Press, 2014, ISBN 978-0-262-02818-9
2. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 007-0-42807-7
3. Parag Kulkarni, "Reinforcement and Systemic Machine Learning for Decision Making", Wiley, IEEE Press, 2012, ISBN: 978-0-470-91999-6

REFERENCES:

1. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Second Edition, Springer, 2009, ISBN: 978-0-387-84857-0
3. Giacomo Tollo, StoyanTanev, Giacomo Liott, Davide De March, "Using online textual data, principal component analysis and artificial neural networks to study business and innovation practices in technology-driven firms", Elsevier Journal on Computers in Industry, Vol. 74, Pages 16-28, 2015
4. Luca Pasa, Alberto Testolin, Alessandro Sperduti, "Neural Networks for Sequential Data: a Pre-training Approach based on Hidden Markov Models", Elsevier Journal on Neurocomputing 169, Pages 323–333, 2015.

**COURSE SYLLABI
(2016-2018)**

DEPARTMENT OF COMPUTER ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Internet of Things: Design
			COURSE CODE	:	CS512
			COURSE CREDITS	:	04
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :			EVALUATION SCHEME :				
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> CS512.CEO.1: To understand the basics of Internet of Things (IoT). CS512.CEO.2: To get basic knowledge of key technologies in Internet of Things and their applications in various areas. CS512.CEO.3: To make students aware of various software and hardware resources available for IoT.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> CS512.CEO.1: Understand the basics of Internet of Things. CS512.CEO.2: Apply key technologies in Internet of Things and their applications in various areas. CS512.CEO.3: Analyze and identify various software and hardware resources available for IoT and applications
THEORY:

What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU -T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities, Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.

Design Principles for Connected Devices: Technology, Web Thinking for Connected Devices, Affordances, Prototyping, Sketching, Familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Changing Embedded Platform, Physical Prototypes and Mass Personalization, Climbing into the Cloud, Open Source versus Closed Source, Mixing Open and Closed Source, RFID: Introduction, Principle of RFID, Components of an RFID system, Issues.

Fundamental IoT Mechanisms And Key Technologies, Prototyping Embedded Devices, Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino: Developing on the Arduino, Openness, Raspberry Pi: Cases and Extension Boards, Developing on the Raspberry Pi, Openness, BeagleBone Black : Cases and Extension Boards, Developing on the BeagleBone, Openness.

PRACTICAL:		
Practical No. 1	Title: Internet and web basics	2 Hours
Internet and web basics.		
Practical No. 2	Title: Arduino and Raspberry Pi study	2 Hours
Study of development boards of Arduino and Raspberry Pi		
Practical No. 3	Title: Open source software and IDE installation	2 Hours
Installation of open source software and IDE for communication with the boards on Linux platform		
Practical No. 4	Title: Monitoring sensors.	2 Hours
Study of various sensors available for monitoring.		
Practical No. 5	Title: Getting the data and stream values from sensors	2 Hours
Getting the data and stream values from sensors to the development board.		
Practical No. 6	Title: Demonstrate the use of streaming data	2 Hours
Application codes to demonstrate the use of streaming data captured from the board		
Practical No. 7	Title: Installation and embedding the codes into boards	2 Hours
Installation and embedding the codes into boards along with sensors and keeping it in continuous execute		

TEXT BOOKS:

1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", ISBN 978-1-118-43062-0 (paperback); ISBN 978-1-118-43063-7 (ebook); 978-1-118-43065-1 (ebook), 2014 John Wiley and Sons, Ltd.
2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

REFERENCES:

1. HakimaChaouchi, " The Internet of Things Connecting Objects to the Web" ISBN : 978-1-84821-140-7, Willy Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications
3. Daniel Kellmereit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978-0989973700.
4. Qian Xu, Pinyi Ren, Houbing Song, andQinghe Du, "Security Enhancement for IoTCommunication Exposed to Eavesdroppers With Uncertain Locations" ,IEEE , Vol: 4, 2016.

DEPARTMENT OF COMPUTER ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Technical Writing
			COURSE CODE	:	EX 502
			COURSE CREDITS	:	02
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			TERM WORK	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	NIL	40	NIL	10	50	NIL	100

PRE-REQUISITE:

1. HP101 - Language & Communication – 1
2. HP102 - Language & Communication – 2

COURSE OBJECTIVES:

1. EX502.CEO.1: Provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations. Reviewing and some common mistakes reviewers make.

COURSE OUTCOMES:

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

1. EX502.CO.1: Identify the correct verb tenses; write more effectively in English for argument essays.
2. EX502.CO.2: Identify plagiarism and explain how to prevent it
3. EX502.CO.3: Read and analyze several articles to form your own opinion on a topic - make connections between several articles
4. EX502.CO.4: Write a 7-8 page research paper - use source material correctly with MLA format

THEORY:

Introduction to Technical Communication, Reading Skill, Basics of English Grammar, Technical Writing, Reports and Proposals, Referencing and Styling.

Anatomy of a Research Article , Sternberg's 12 steps of Writing, Research Paper Writing, Technology-enabled Communication, Interpretation and Use of Charts, Graphs and Tables, Software Tools for Technical Writing

PRACTICAL:

Practical No. 1	Title: A Group Discussion or 'Role Play	2 Hours
A Group Discussion or 'Role Play' on a topic / case to be assigned to students well in time, with groups comprising six students drawn from various disciplines. Members of the group will be evaluated by two peers, all to be assigned impromptu in the class. Faculty attending will modulate the evaluations.		
Practical No. 2	Title: Preparation of Innovative research article	2 Hours
Preparation, submission of an innovative research article in the field of their interest / specialization.		

TEXT BOOKS:

1. Advanced Learners's Dictionary. 8th edition, 2013., Oxford University Press; 9th Edition (2014), ISBN : 978-0194799485
2. Paul V. Anderson, Technical Communication: A Reader-centered Approach, 8th edition, 1st Indian reprint, new Delhi: Cengage Learning, 2014, ISBN: 9788131514030

REFERENCES:

1. Martin Hewings, Advanced Grammar in Use, Cambridge University Press, 2013, ISBN: 9780521532921.
2. Michael Swan, Practical English Usage. 3rd Edition, Oxford University Press-New Delhi, 2006, ISBN: 9780195679892
3. John Seely, The Oxford Guide to Effective Writing and Speaking, Oxford University Press, 2005, ISBN: 9780199652709.
4. [http://onlinestatbook.com/Online_Statistics_Education.pdf

DEPARTMENT OF COMPUTER ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Machine Learning - II
			COURSE CODE	:	CS521
			COURSE CREDITS	:	04
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
<ol style="list-style-type: none"> 1. CS521.CEO.1: To introduce the basic theory underlying machine learning. 2. CS521.CEO.2: To understand the basic building blocks and general principles that allow one to design machine learning algorithms 3. CS521.CEO.3: To formulate machine learning problems corresponding to different applications. 4. CS521.CEO.4: To read current research papers and understands the issues raised by current research.

COURSE OUTCOMES:
<p>After completion of the course, the students will be able to</p> <ol style="list-style-type: none"> 1. CS521.CO.1: Differentiate the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. 2. CS521.CO.2: Understand of the strengths and weaknesses of many popular machine learning approaches. 3. CS521.CO.3: Apply the mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

4. CS521.CO.4: Design and implement various machine learning algorithms in a range of real-world applications.

THEORY:

Introduction to multilayer perceptron's and local model, kernel machine, **Hidden Markov Models:** Discrete Markov Processes, Hidden Markov Models, Three Basic Problems of HMMs, Evaluation Problem, Finding the State Sequence, Learning Model Parameter, Continuous Observations, The HMM with Input, Model Selection in HMM, **Application:** Traffic Prediction in Wireless Channels using Java, Face recognition, text recognition

Reinforcement Learning: Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Value Iteration, Policy Iteration, Temporal Difference Learning, Exploration Strategies, Deterministic Rewards and Actions, Nondeterministic Rewards and Actions, Eligibility Traces, Generalization, **Case Studies:** Dynamic Resource Allocation, Channel Assignment

Design and Analysis of Experiments: Factors and strategy of Experimentation, Response Surface Design, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Interval Estimation, Hypothesis Testing, Assessing a Classification Algorithm's Performance, Comparing Classification Algorithms: two classification and multiple classification **Applications:** Handwriting/Digit Recognition, Spam Filtering, Product Recommendation

PRACTICAL: Implement following Assignments /Application in any language using any Tool i.e. MATLAB, Python OR JAVA (Any 3 assignment: 1 implementation & 2 Case study)

Practical No. 1	Title: Recommendation Systems	2 Hours
Study of recommendation Systems		
Practical No. 2	Title: Time series prediction	2 Hours
Study of time series prediction		
Practical No. 3	Title: Pattern recognition	2 Hours
Study of pattern recognition like Face, finger, hand, character etc.		
Practical No. 4	Title: Pattern recognition implementation	2 Hours
Design & Implement of any one pattern recognition		
Practical No. 5	Title: Traffic Prediction in Wireless Channels	2 Hours
Design & Implementation of Traffic Prediction in Wireless Channels using Java		
Practical No. 6	Title: recommendation using reinforcement learning	2 Hours
Design & Implementation of product recommendation using reinforcement learning		

TEXT BOOKS:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning)", First Edition, ISBN 978-0262193986
2. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 007-0-42807-7
3. Parag Kulkarni, "Reinforcement and Systemic Machine Learning for Decision Making", Wiley, IEEE Press, 2012, ISBN: 978-0-470-91999-6

REFERENCES:

1. EthemAlpaydin, "Introduction to Machine Learning", Third Edition, The MIT Press,2014, ISBN 978-0-262-02818-9
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press 2012.
3. Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer 2007.
4. S. Haykin. Neural networks and learning machines. Pearson 2008.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2016-17	
FY MTECH		COURSE NAME	:	Internet of Things: Applications	
		COURSE CODE	:	CS522	
		COURSE CREDITS	:	04	
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
.3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

1. IT101 – Computer Programming
2. CS303 - Data Communication & Networking
3. CS212 - Database Management Systems
4. CS202 - Digital Electronics and Microprocessors
5. CD512 - Internet of Things: Design

COURSE OBJECTIVES:

1. CS522.CEO.1: To apply the concept of Internet of Things (IoT) in the real world scenario.
2. CS522.CEO.2: To identify and describe different types of open source hardware.
3. CS522.CEO.3: To dissect and examine issues of privacy and security in IoT.

COURSE OUTCOMES:

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

1. CS522.CO.1: Outline the application usage of IoT in real time scenario.
2. CS522.CO.2: Design and illustrate the system using Arduino/Raspberry Pi or equivalent hardware.
3. CS522.CO.3: Demonstrate the knowledge of security and ethical issues in IoT.

THEORY:

Internet of Things Privacy, Security And Governance: Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.

Raspberry Pi Platform: Raspberry Pi GPIO, Establishing a Raspberry Pi Development Station and ingredients, Setting Up the Raspberry Pi Software, The LAMP Project, MySQL Database, Temperature Sensor Networks, Serial Peripheral Interface, Database connectivity with Python programming, GPIO Pin Expansions, Interrupts, Conventional Webcam, Motion features and setup, Webcam viewing, Raspberry Pi Camera, Python with camera, Remote camera interfaces

Arduino Platform: Arduino Uno hardware and its features, types, programming the Arduino, data types, variable, constants, operators, control statements, loops, functions, strings, time, arrays, function libraries, Arduino due and zero, pwm, random numbers, interrupts, communication, inter IC's, serial interfaces, sensors of arduino: temperature, light and humidity, Ethernet shield, sketching the IDE, electronic components, basic applications: blinking LEDs, reading voltage, traffic control, buzzer control.

PRACTICAL:

Each student will be assigned with a problem statement separately. On that basis student has to develop mini project using IoT design and application.

TEXT BOOKS:

1. Donald Norris, "Internet of Things: Do-it-yourself", 1st Edition, 2015, McGraw Hill Education, ISBN:978-0-07-183520-6
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", 1st Edition, 2014, John Wiley and Sons Ltd, ISBN:978-1-118-43062-0
3. Peter Membrey and David Hows, "Learn Raspberry Pi with Linux", 1st Edition, 2012, Apress Publications, ISBN:978-1-4302-4822-4
4. Simon Monk, "Programming Raspberry Pi: Getting Started with Python", 2nd Edition, 013, McGraw Hill Publications, ISBN: 978-0-07-180784-5

REFERENCES:

1. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web", 2010, Willy Publications, ISBN : 978-1-84821-140-7
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", 2nd Edition, 2012, Willy Publications, ISBN: 978-1-119-99435-0
3. Daniel Kellmerit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things", 1st Edition, 2014, Lightning Source Inc., ISBN:978-0989973700
4. Daeil Kwon, Melinda Hodkiewicz, "IoT-Based Prognostics and Systems Health Management for Industrial Applications", IEEE, Volume 4, July 2016.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2016-17	
FY MTECH		COURSE NAME	:	PROJECT WORK - I	
		COURSE CODE	:	CS523	
		COURSE CREDITS	:	02	
RELEASE DATE	:	1/08/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			TERM WORK	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NIL	04	NIL	NIL	NIL	NIL	50	50

PRE-REQUISITE:

1. EX501 : Research Methodology
2. CS502 : Technical Writing

COURSE OBJECTIVES:

1. CS523.CEO.1: To Manage the selection and initiation of individual projects.
2. CS523.CEO.2: To conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS523.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
2. CS523.CO.2: Develop effective communication and presentation skills.
3. CS523.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

CONTENTS:

Project work is divided into four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.

Project Stage I is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

**Curriculum for
Second Year
Master of Technology**

2016-2020

(With Effect from Academic Year: 2017-2018)

DEPARTMENT OF COMPUTER ENGG.

W.E.F

:

2017-18

SY MTECH

RELEASE DATE

:

1/08/2017

REVISION NO.

:

0.0

TRIMISTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	DE1	CS63#	Elective course - I	3	--	3
2.	DE2	CS64#	Elective course - II	3	--	3
3.	SDP2	CS601	Project Work - II	--	8	4
TOTAL				6	8	10

TRIMISTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	SDP3	CS611	Project Work - III	--	20	10
TOTAL				--	20	10

TRIMISTER: VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	SDP4	CS621	Project Work - IV	--	20	10
TOTAL				--	20	10

Note: L: Lecture, P: Practical

Course Code	Elective Course – I Name
CS631	Information Retrieval
CS632	Infrastructure and Network Management
CS633	Computer Vision
CS634	Network Security Techniques
CS635	Open Elective

Course Code	Elective Course – II Name
CS641	Big Data Analytics
CS642	Virtualization and Cloud Computing
CS643	Business Intelligence
CS644	Ad-hoc Wireless Network: Principle, Protocol and Applications
CS645	Open Elective

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Information Retrieval	
		COURSE CODE	:	CS631	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

1. CS631.CEO.1: To learn the information retrieval models.
2. CS631.CEO.2: To be familiar with Web Search Engine.
3. CS631.CEO.3: To be exposed to Link Analysis
4. CS631.CEO.4: To understand Hadoop and Map Reduce
5. CS631.CEO.5: To learn document text mining techniques

COURSE OUTCOMES:

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

1. CS631.CO.1: To understand the theoretical basis behind the standard models of IR (Boolean, Vector-space, Probabilistic and Logical models),
2. CS631.CO.2: To understand the difficulty of representing and retrieving documents, images, speech, etc.
3. CS631.CO.3: To implement, run and test a standard IR system
4. CS631.CO.4: To Develop the standard methods for Web indexing and retrieval,
5. CS631.CO.5: To evaluate techniques from natural language processing, artificial intelligence, human-computer interaction and visualization integrate with IR, and be familiar with various algorithms and systems.

THEORY:

INTRODUCTION: Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks – The impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search – Components of a Search engine- Characterizing the web.

INFORMATION RETRIEVAL: Boolean and vector-space retrieval models- Term weighting – TF-IDF weighting- cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model based IR – Probabilistic IR –Latent Semantic Indexing – Relevance feedback and query expansion.

WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING : Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – meta-crawlers- Focused Crawling – web indexes – Near-duplicate detection – Index Compression – XML retrieval.

WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH: Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop & Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web – Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

DOCUMENT TEXT MINING: Information filtering; organization and relevance feedback – Text Mining - Text classification and clustering – Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro – Neto,
3. Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
4. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
5. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010..

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. OphirFrieder “Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series “, 2nd Edition, Springer, 2004.
3. Manu Konchady, “Building Search Applications: Lucene, Ling Pipe”, and First Edition, Gate Mustru Publishing, 2008.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Infrastructure and Network Management	
		COURSE CODE	:	CS632	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS303 - Data Communication & Networking
3. CS302 - Operating System

COURSE OBJECTIVES:

1. CS632.CEO.1: To estimate IT infrastructure characteristics and components (Understanding).
2. CS632.CEO.2: To categorize IT infrastructure vendors and their products (Analyze).
3. CS632.CEO.3: To interpret storage, backup, server, security and alerts (Apply).
4. CS632.CEO.4: To illustrate current trends in infrastructure management (Apply).

COURSE OUTCOMES:

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

1. CS632.CO.1: Identify parameters of infrastructure management; describe common infrastructure management activities and solutions.
2. CS632.CO.2: Evaluate storage architecture and understand current trends, tools and applications used in infrastructure.
3. CS632.CO.3: Describe storage networking technologies and data archival solutions.
4. CS632.CO.4: Articulate business requirements and infrastructure management

THEORY:

INTRODUCTION: Definition of IM, Components of IM(Policies, Processes, Equipment, Data, Human Resources, and External Contacts), Service Platforms(System Management, Network Management and Storage Management , Server Management, Database Management, Application Management, End User Management, Data Center Management, Configuration Management, Automation, Operations Quality and IT Helpdesk, Business Demand of IT infrastructure),Latest trends in IM (Cloud, Big Data, data analytics and Virtualization), IT Infrastructure service providers (IBM, HP, HCL, CISCO, Amazon etc.)

INFRASTRUCTURE MANAGEMENT SERVICES: Factors to consider in designing IT Infrastructure, Determining customer's Requirements, Data, Applications, Tools and their Integration, Patterns for IT systems management, Introduction to the design process for information systems, Service Models.

SERVICE MANAGEMENT: Definition of Service, Importance of Service, Information Technology Infrastructure Library (ITIL) : Service Delivery Processes, Service-level management, financial management and costing, IT services continuity management, Capacity management, Availability management, Service Support Processes, Configuration Management, Service desk : Incident management. Problem management, Change management, Release management, Case Study : BMC Remedy, IBM Maximo etc.

Server Administration(User administration, Configuration and Maintenance of Server, Coordination with sub vendors in case of hardware failure, Availability of Server, Managing of Server Downtime,Causes and Consequences of downtime), **Security Administration** (Importance of Security, System Security administration (Password level security, access level security), **Network Security administration** (Unauthorized network users, Monitoring Network, Vulnerabilities, Firewall, Gateways, analyze and establish security requirements of network), **IT security administration** (Cyber law, Train employees for security awareness and procedures, Conduct security audits and make policy recommendations)), Case Study : Tivoli Identity Manager (TIM), Tivoli Access Managements (TAM) etc.

Storage Administration

Challenges, Data Storage Infrastructure, Components of a Storage System Environment(Disk drive components, Disk Drive performance, Logical Components), Data Protection (concept of RAID, RAID levels (RAID 0, 1, 3, 5, 0+1/1+0,and 6), Intelligent Storage System (ISS) and its components, Implementation of ISS as high-end and midrange storage arrays) ,Overview of FC-SAN, NAS, and IP-SAN, Network-Attached Storage (NAS) (Benefits of NAS, Components, Implementations, I/O operations, Performance and Availability), Content Addressed Storage (CAS) (Features and Benefits of a CAS, CAS Architecture, Storage and Retrieval)

Network Administration

Fiber Optic Network (Introduction, Dark Fiber, Plastic Optical Fiber, FDDI etc.), Switches and Routers for storage (Brocade, CISCO Fabric Router and Switches, Emulex, HP), Basics of SDN.

Backup Administration

Importance, Types of Backup,Backup/Recovery purposes and considerations, Architecture and different backup/recovery topologies, remote replication technologies and their operation, emerging technologies

like de-duplication, offsite backup,

Case Study: IBM and Reporting Administration: Importance, Configuration Management Database (CMDB), Server Availability Monitoring.

Case Study :Bocada for Backup reporting, Crystal Reports, Oracle reports for Database, IBM Cognos.

TEXT BOOKS:

1. G. Somasundaram, AlokShrivastava, EMC Educational Services, Information Storage and Management, Wiley Publishing, Inc., India, ISBN: 978-0-470-29421-5.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003, ISBN: 0072224762, 9780072224764
3. Jan Van Bon, "Foundations of IT Service Management: based on ITIL", Van Haren Publishing, 2nd edition 2005, ISBN: 978 90 77212 58 5.

REFERENCES:

1. HakimaChaouchi, " The Internet of Things Connecting Objects to the Web", 2010, Willy Publications, ISBN : 978-1-84821-140-7 Marc Farley, "Building Storage Networks",Tata McGraw Hill ,Osborne, 2001, ISBN 0-07-212050-9.
2. Harris Kem, Stuart Gaiup, Guy Nemiro, "IT Organization: Building a World Class Infrastructure", Prentice Hall, 2000, ISBN:0-13-022298-4, 13: 978-0-13-022298-5.
3. Richard Barker and Paul Massiglia, Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs., Wiley India, ISBN 0-471-03445-2
4. Meet Gupta, .Storage Area Network Fundamentals., Pearson Education Limited, 2002, ISBN-10, 8178087774

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Computer Vision	
		COURSE CODE	:	CS633	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS323 - Signal Processing & Application
2. AS201 - Applied Mathematics

COURSE OBJECTIVES:

1. CS633.CEO.1: To describe the foundation of image formation, measurement, and analysis.
2. CS633.CEO.2: To implement common methods for robust image matching and alignment.
3. CS633.CEO.3: To gain exposure to object and scene recognition and categorization from images.

COURSE OUTCOMES:

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

1. CS633.CO.1: To demonstrate a thorough knowledge of fundamental concepts pertaining to computer vision.
2. CS633.CO.2: To segment objects in an image based on texture and color features.
3. CS633.CO.3: To design and implement a computer vision project utilizing the concepts taught in this course and evaluate their approach, analyze results and present research in class

THEORY:

Introduction: Digital Image Processing & Computer Vision-Introduction, Digital Image Fundamentals, Relationships between pixels, Distance measures; Image operations

Image Enhancement: Image Enhancement in spatial domain Gray level , Histogram processing , Enhancement operations , Frequency Domain 2-D Fourier transform, Convolution and Correlation theorems; Filtering in frequency domain - low pass smoothing, high pass sharpening.

Image restoration and reconstruction: Image degradation and restoration processes, Restoration in the presence of noise, linear position, Geometric

Image processing: Image segmentation, Image compression –Fundamentals, basic compression methods-Huffman coding, golomb coding, bit plane coding, wavelet coding, Image wavelets and description-Wavelets-Background of wavelets, multiresolution expansion, wavelet transforms in one dimensions, Image descriptions Image.

Object Recognition: Patterns and pattern classes; Decision theoretic methods , Structural methods, Need of intelligent processing and expert systems

TEXT BOOKS:

1. R. Gonzalez, R. Woods, and S. Eddins, Digital Image Processing Using Matlab (second edition), Gatesmark Publishing, 2009.
2. Richard Szeliski, "Computer Vision: Algorithm and Applications",Springer,2011,ISBN 978-1-84882-935-0

REFERENCES:

1. R. Gonzalez and R. Woods, Digital Image Processing (third edition), Prentice-Hall, 2008
2. Forsyth, David A. & Ponce, Jean," Computer Vision ,modern Approach" , Prentice Hall Professional Technical Reference,2000
3. Brian L. DeCost,Harshvardhan Jain,Anthony D. Rollett,Elizabeth A. Holm,"Computer Vision and Machine Learning for Autonomous Characterization of AM Powder Feedstocks",Springer ,2016
4. Xianghua XieMark Jones,Gary Tam,"Recognition, Tracking, and Optimization", Springer 2017

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Network Security Techniques	
		COURSE CODE	:	CS634	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS634.CEO.1: Identify various network security threats
2. CS634.CEO.2: Explain the concepts of malicious codes
3. CS634.CEO.3: Build security model to prevent, detect and recover from the attacks
4. CS634.CEO.4: Illustrate various securities issues and techniques applied in network security.
5. CS634.CEO.5: Analyze algorithms used to provide confidentiality, integrity and authenticity

COURSE OUTCOMES:

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

1. CS634.CO.1: Identify various security practices applied in real time applications
2. CS634.CO.2: Analyze information security issue in computer and networking environment.
3. CS634.CO.3: Explain network security principles.
4. CS634.CO.4: Develop security algorithms for given computing system.
5. CS634.CO.5: Design security solution for given computing system.

THEORY:

A Model for Network Security, Classical Encryption Techniques.

Block Ciphers and the Data Encryption Standard: Strength of DES, Cryptanalysis, Block Cipher Design Principles, Finite Fields of the Form $GF(p)$, Advanced Encryption Standard, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Cryptographic Hash Functions: Simple Hash Functions, Requirements and Security, Cipher Block Chaining, MACs Based on Hash Functions, Authenticated Encryption, And Digital Signature Standard.

Key Management and Distribution: Symmetric Key Distribution Techniques, Distribution of Public Keys, User Authentication Protocols, Remote User Authentication, Federated Identity Management

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fifth Edition, 2011.
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.
3. Principles of Information Security: Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.

REFERENCES:

1. Cryptography and Network Security : ForouzanMukhopadhyay, McGraw Hill,
2. Godbole," Information Systems Security", Willey Publication
3. Mark Stamp, "Information Security: Principles and Practice", Wiley Inter Science, 2011
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 2007

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Big Data Analytics	
		COURSE CODE	:	CS641	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

1. CS641.CEO.1: To learn the concept of Big data and applications of big data analytics
2. CS641.CEO.2: To use advanced Storage technologies like Hadoop

COURSE OUTCOMES:

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

1. CS641.CO.1: To apply Hadoop ecosystem components.
2. CS641.CO.2: To Develop Map Reduce Work Application.
3. CS641.CO.3: To Create the HDFS tables and loading them in Hive and learn joining of tables in Hive.
4. CS641.CO.4: To build and maintain reliable, scalable, distributed systems with Apache Hadoop.
5. CS641.CO.5: To design and build MongoDB based Big data Applications.

THEORY:

Parallel database architecture, Design of parallel systems, Study of DDBMS architectures, Analysis of Concurrency control in distributed databases, Implementation of Distributed query processing.

Apache Hadoop & Hadoop Ecosystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization. Building blocks of hadoop, components of hadoop (HDFS, Map-reduce) , HBASE, HIVE, PIG, Zookeeper .

Stages of analytical evolution, State of the Practice in Analytics, The Data Scientist, Big Data Analytics in Industry Verticals, Data Analytics Lifecycle, Operationalizing Basic Data Analytic Methods Using R, Advanced Analytics - Analytics for Unstructured Data - Map Reduce and Hadoop, In-database Analytics, Data Modeling.

Benefits of NOSQL, NOSQL using MongoDB- mongoDB shell, data types, manipulation (insert, update, delete documents), querying, aggregation, indexing, crowd-sourcing.

TEXT BOOKS:

1. Coronel, Morris and Rob, “Database Principals: Fundamentals of Design, Implementation and Management”,9th edition, Cengage Learning, (ISBN: 978-81-315-1736-9)
2. Bill Franks, “Taming The Big Data Tidal Wave”, 1st Edition, Wiley, 2012.
3. VigneshPrajapati, “Big Data Analyticswith R and Haoop”, Packet Publishing 2013.
4. Kyle Banker, Piter Bakkum, Shaun Verch, “MongoDB in Action” Dream tech Press
5. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.

REFERENCES:

1. Raghu Ramkrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, McGraw Hill International Edition
2. Thomas Connolly,Carolyn Beg —Database Systems :Practical approach to design implementation and management — third edition, Pearson education
3. Jared Dean, “Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners”, Wiley India Private Limited, 2014.
4. Raghu Ramkrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, McGraw Hill International Edition.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Network Security Techniques	
		COURSE CODE	:	CS634	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS634.CEO.1: Identify various network security threats
2. CS634.CEO.2: Explain the concepts of malicious codes
3. CS634.CEO.3: Build security model to prevent, detect and recover from the attacks
4. CS634.CEO.4: Illustrate various securities issues and techniques applied in network security.
5. CS634.CEO.5: Analyze algorithms used to provide confidentiality, integrity and authenticity

COURSE OUTCOMES:

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

1. CS634.CO.1: Identify various security practices applied in real time applications
2. CS634.CO.2: Analyze information security issue in computer and networking environment.
3. CS634.CO.3: Explain network security principles.
4. CS634.CO.4: Develop security algorithms for given computing system.
5. CS634.CO.5: Design security solution for given computing system.

THEORY:

A Model for Network Security, Classical Encryption Techniques.

Block Ciphers and the Data Encryption Standard: Strength of DES, Cryptanalysis, Block Cipher Design Principles, Finite Fields of the Form $GF(p)$, Advanced Encryption Standard, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Cryptographic Hash Functions: Simple Hash Functions, Requirements and Security, Cipher Block Chaining, MACs Based on Hash Functions, Authenticated Encryption, And Digital Signature Standard.

Key Management and Distribution: Symmetric Key Distribution Techniques, Distribution of Public Keys, User Authentication Protocols, Remote User Authentication, Federated Identity Management

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fifth Edition, 2011.
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.
3. Principles of Information Security: Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.

REFERENCES:

1. Cryptography and Network Security : ForouzanMukhopadhyay, McGraw Hill,
2. Godbole," Information Systems Security", Willey Publication
3. Mark Stamp, "Information Security: Principles and Practice", Wiley Inter Science, 2011
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 2007

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Business Intelligence	
		COURSE CODE	:	CS643	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. AS501 – Computing and Mathematics

COURSE OBJECTIVES:

1. CS643.CEO.1: To introduce the idea of decision making in complex industrial and service environments
2. CS643.CEO.2: To understand the science behind better predictions and decisions.
3. CS643.CEO.3: To generate an ability to design, analyze and perform experiments on real life problems using various Decision making methodologies

COURSE OUTCOMES:

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

1. CS643.CO.1: To understand articulate modern BI practices, including knowledge integration, sourcing and managing BI solutions.
2. CS643.CO.2: To discuss the social and ethical issues related to the use of Business Intelligence technologies in organizations.
3. CS643.CO.2: To understand articulate the crucial role that Business Intelligence plays in careers as well as in business and society in the 21st century.
4. CS643.CO.4: To understand articulate modern concepts, theories, and research in the field of

Business Intelligence.

5. CS643.CO.5: To apply BI enabling technologies in organizational settings.

THEORY:

Introduction: BI Definitions & Concepts, BI Infrastructure Components, The Architecture of BI and its types, Development of a business intelligence system, Role of Data Warehousing in BI, Business Applications of BI.

Definition of system: Representation of the decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.

Structure of mathematical models: Data exploration, Bivariate analysis, Graphical analysis, Regression, Significance of the coefficients Analysis of variance, Multi-collinearity of the independent variables, Confidence and prediction limits.

Definition of time series: Evaluating time series models Distortion measures Dispersion measures, Decomposition of a time series, Exponential smoothing models, , Removal of trend and seasonality,

Relational marketing: Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Market basket analysis, Web mining, Response functions, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry

TEXT BOOKS:

1. Carlo Vercellis, "Business Intelligence", John Wiley & sons 2009 edition , ISBN 978-0-470-51138-1

REFERENCES:

1. Elizabeth Vitt, Michael Luckevich, "Business Intelligence: Making Better Decision", Microsoft Press, 2002 edition, ISBN 0-7356-1627-2
2. Larissa T. Moss, Shaku Atre, "Business Intelligence Roadmap: The Complete Project Life cycle for Decision Support systems", Addison – Wesley Information Technology Series 2008, ISBN 0-201-78420-3

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	Ad-hoc Wireless Network: Principle, Protocol and Applications	
		COURSE CODE	:	CS644	
		COURSE CREDITS	:	03	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS644.CEO.1: To illustrate principles of different types of Ad hoc network
2. CS644.CEO.2: To design MAC and Routing protocol of Ad hoc network
3. CS644.CEO.3: To explain the importance of QOS and Energy efficiency in Ad hoc network.

COURSE OUTCOMES:

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

1. CS644.CO.1: To Explain the concept of ad hoc network in real time applications
2. CS644.CO.2: To design various protocols with Ad hoc network constraints
3. CS644.CO.3: To develop ad hoc wireless network for enhancement in protocols

THEORY:

Introduction: Fundamentals of WLANS, IEEE 802.11 Standard, HIPERLAN Standard, AD HOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.

MAC Protocols: Design Issues and goals of MAC protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Based MAC Protocols with Scheduling Mechanisms, MAC Protocols using Directional Antennas, Other MAC Protocols. Application

Routing Protocols: Design Issues and goals of Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Application

Transport Layer and Security Protocols: Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer protocol, TCP Over Ad Hoc Wireless Networks, Importance of Security in Ad Hoc Wireless Networks, Network Security, Application of Secure communication in MANET and VANET.

Wireless Sensor Networks: Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, IoT with WSN. Energy Management in WSN, Application of energy efficient routing protocol in Agriculture Environment Sensing.

Quality of Service: Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks. Application & Case Study.

TEXT BOOKS:

1. C D M Cordeiro, D. P. Agarwal, "Adhoc and Sensor Networks: Theory and applications", World Scientific, 2006, ISBN: 981-4-338-885
2. Jagannathan Sarangapani, "Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control", CRC Press, 2007, ISBN: 978-0-8247-2675-1
3. Asoke K Talukder and Roopa R. Yavagal, "Mobile Computing – Technology, Applications and Service Creation", 2nd Edition, TMH Publication, 2006, ISBN: 978-0-07-014457-6

REFERENCES:

1. C.K. Toh, "Ad- Hoc Mobile Wireless Networks: Protocols & Systems", 1st Edition, Pearson Education, ISBN: 9780132442046.
2. C. S. Raghavendra, Krishna M. Sivalingam, "Wireless Sensor Networks", Springer, 2004, ISBN: 978-3-540-77689-5.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, "Mobileadhoc networking", Wiley-IEEE press, 2004, ISBN: 978-0-471-65688-3.
4. Senthilnathan Palaniappan, Kalaiarasan Chellan, "Energy-efficient stable routing using QoS monitoring agents in MANET", In: Journal of Wireless and Communication and Networking, Springer, 2015.

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	PROJECT WORK - II	
		COURSE CODE	:	CS604	
		COURSE CREDITS	:	04	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			TERM WORK	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NIL	8	NIL	NIL	NIL	50	50	100

PREREQUISITES:

1. CS523 : Project Work I

COURSE OBJECTIVES:

1. CS604.CEO.1: To develop self-management, documentation & technical skills.
2. CS604.CEO.2: To Demonstrate a strong working knowledge of ethics and professional responsibility.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS604.CO.1: Develop self-management, documentation & technical skills.
2. CS604.CO.2: Design, analyze & troubleshoot schematics, connection diagrams, block diagrams, timing diagrams for a given electronics circuit or system.

CONTENTS:

Project Stage II is related with Goals and Objectives, System Architecture, Algorithm /Methodology. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Expected Outcome and Result
- Preparation of manuscript (paper) on Literature survey

Final Project Stage II Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

**COURSE SYLLABI
(2016-2018)**

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	PROJECT WORK - III	
		COURSE CODE	:	CS611	
		COURSE CREDITS	:	10	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			TERM WORK	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NIL	20	NIL	NIL	NIL	150	50	200

PREREQUISITES:

1. CS523: Project Work - I
2. CS601: Project Work- II

COURSE OBJECTIVES:

1. CS611.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:

1. CS611.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS:

Project Stage III is related with Design, Algorithm /Methodology Implementation Results. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on design
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry

**COURSE SYLLABI
(2016-2018)**

DEPARTMENT OF COMPUTER ENGG.		W.E.F.	:	2017-18	
SY MTECH		COURSE NAME	:	PROJECT WORK - IV	
		COURSE CODE	:	CS621	
		COURSE CREDITS	:	10	
RELEASE DATE	:	1/08/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			TERM WORK	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NIL	20	NIL	NIL	NIL	200	100	300

PREREQUISITES:
<ol style="list-style-type: none"> 1. CS523: Project Work I 2. CS601: Project Work II 3. CS611: Project Work III

COURSE OBJECTIVES:
<ol style="list-style-type: none"> 1. CS621.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:
<ol style="list-style-type: none"> 1. CS621.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS:

Project work IV is related with algorithm/methodology, implementation, Results, Result analysis using various charts/graphs, Project report submission and end trimester presentation will be conducted by department based in following points.

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- System architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Result Analysis
- Preparation of manuscript (paper) on literature survey as mentioned in project work –II.
- Preparation on manuscript (paper) on design as mentioned in Project work –III.
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc. as mentioned in project Work – III)
- Publication details of paper on Result analysis (Peer reviewed / free International Journal)

Final Project Stage IV Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.