Detailed Syllabus
Lecture-wise Breakup

Course Code	14M1NCI339	**Semester Odd (specify Odd/Even)**	**Semester** M.Tech (III) **Session** 2018-19 **Month from** Jul-Dec 2018
Course Name	Wireless Sensor and Actuator Networks		
Credits	3	**Contact Hours**	3-0-0 (3 hrs per week)

Faculty (Names)	**Coordinator(s)**	Dr. Adwitiya Sinha
	Teacher(s) (Alphabetically)	Dr. Adwitiya Sinha

COURSE OUTCOMES		**COGNITIVE LEVELS**
C140.1	Develop distribution models for deterministic or stochastic network deployment	Understand Level (Level 2)
C140.2	Designing communication protocols for wireless sensor network standards	Apply Level (Level 3)
C140.3	Develop mathematical models for energy consumption	Creation Level (Level 6)
C140.4	Analyse medium access mechanisms, routing protocols	Analyze Level (Level 4)
C140.5	Analyse cross layer schemes, including load balancing and node clustering	Analyze Level (Level 4)
C140.6	Performance evaluation of sleep scheduling strategy with data prediction and aggregation methods	Evaluation Level (Level 5)
C140.7	Develop Coverage Maximization models for optimizing network lifetime	Creation Level (Level 6)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Review of Wireless sensor and actuator networks	Introduction to wireless networks and mainly on sensor and actuator networks, Terminology, Introductin radio spectrum, Applications, Propagation mechanism-Free space and Two Ray model, Functions: aggregation, dissemination and management	5
2.	Wireless Sensor Network Requirements	Network scenarios, Types of deployment strategies, Challenges, Sensor components and characteristics, Energy Harvesting, Distributed sensor network	5
3.	Technologies and simulators used	Network Simulator, Glomosim, Qualnet	4
4.	Sensor Network Architectures & Standards	IEEE Sensor Network Standard/ZigBee, Single-hop and Multi-hop communication, Sink mobility, Transmission Power Control (levels of transmission), In-Network Data Processing	5
5.	Broad casting & Routing in Wireless Sensor and Actuator Networks	Overview of broadcasting techniques, backbone and broadcasting in sensor actuator networks, coverage and connectivity criteria,Routing alogs	7
6.	Issues and	Sleep scheduling Models & Analysis, Clustering, Load	6

	Challenges	balancing, Energy Hole and Connectivity Gap problem, Poissonian and Gaussian distributed network	
7.	Designing Goals and Protocols	Energy Models, Network Lifetime Maximization, Scheduling & Coverage Optimization. MAC protocols-Low duty cycle and Wake up concepts, Cross layer issues & methods – Optimizing number of Clusters & Cluster Head rotations, Data and Flow Aggregation with analysis	6
8.	Case Studies	Case study of Internet of things applications & open source projects	4
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
Test-1	20
Test-1	20
End Semester Examination	35
TA	25 (Quiz + Evaluative Assignment + Class Test + Attendance)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Wireless Sensor and Actuator Networks Algorithms and Protocols for Scalable Coordination and Data Communication, Edited by Amiya Nayak and Ivan Stojmenovic John Wiley & Sons, Inc.,2010.
2.	Feng Zhao, Leonidas Guibas, Wireless Sensor Networks: An Information Processing Approach, Morgan Kauffman Publication, 2004
3.	William Stallings, Wireless Communications & Networks, 2nd Edition, Pearson Education India, 2009
4.	Kazem Sohraby, Daniel Minoli, Taieb Znati, Wireless Sensor Networks: Technology, Protocols, and Applications, Wiley-Blackwell; 1st edition, 2007
5.	Andrea Conti, Davide Dardari, and Roberto Verdone, Wireless Sensor and Actuator Networks Technologies, Analysis and Design, Academic Press, Elsevier, 2008

Detailed Syllabus
Lab-wise Breakup

Course Code	**17M15CS111**	**Semester:** ODD	**Session** 2018 -2019 **Month from** July to Dec, 2018
Course Name	**Advanced Algorithms Lab**		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Deepti Singh
	Teacher(s) (Alphabetically)	Dr. Nisha Chaurasia

COURSE OUTCOMES		**COGNITIVE LEVELS**
C170.1	Implement algorithms and use appropriate advanced data structures for solving computing problems.	Level 3: Apply
C170.2	Design algorithms using the divide-and-conquer, greedy and dynamic programming strategies, and further recite algorithms that employ these strategies.	Level 1: Remember Level 5: Evaluate
C170.3	Illustrate the mathematical foundation of network flows and some important flow algorithms.	Level 2: Understand Level 3: Apply
C170.4	Implement randomized algorithms to solve various problems, and validate their correctness and complexity.	Level 3: Apply Level 4: Analyze
C170.5	Understand P, NP, polynomial reduction, NP-hardness, and NP-Completeness.	Level 2: Understand Level 4: Analyze
C170.6	Comprehend and select algorithm design approaches in a problem specific manner.	Level 6: Create

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Fundamentalsof data structures and algorithmic problem solving	Searching, Sorting, time complexity, Heaps, Arrays, Linked List, Trees, Fibonacci heaps, splay trees, dynamic trees.	CO1
2.	Divide and Conquer Technique	Solving Matrix multiplication problem and subset- sum problem using divide-and-conquer approach	CO2
3.	Greedy Algorithms	Greedy Approximation algorithms- Set Cover Problem,K Centers Problem,Fractional and 0/1 Knapsack, Coinage problem; Bin packing; Job scheduling, Graph coloring; and Text compression using Huffman coding and Shannon-Fano coding.	CO2
4.	Dynamic Programming Technique	Fundamentals of Dynamic programming based solution approach, Printing Shortest Common Supersequence, Dynamic Programming on Trees, Maximum sum rectangle in a 2D matrix.	CO2
5.	Graph Algorithms	Solve and analyze Graph problems, Algorithms. All Pair Shortest Problem Subset-sum problem. Minimum Spanning Trees (Prim's and Kruskal algorithms); Shortest Path using Dijkstra's algorithm, K-clique problem, Graph Coloring problem.	CO1, CO2

6.	Flows in Network	Network flows - max flow and min-cost flow/circulation, Edmonds-Karp algorithm	CO3
7.	Tractable and Non- Tractable Problems	One Way of Coping with NP-Hardness. Randomized Rounding. Vertex Cover and Travelling Salesman Problem.	CO4, CO5
8.	Project	Project	CO6

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 120	
Lab Test# 2	20
D2D work 60	
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein , Introduction to Algorithms, MIT Press, 3rd Edition, 2009
2.	Hochbaum "Approximation Algorithms for NP-Hard Problems", 1996.
3.	Ahuja, Magnanti and Orlin, "Network Flows: Theory, Algorithms and Applications", 1993.
4.	Horowitz and Sahni, Fundamentals of Computer Algorithms, Computer Science Press, 1978
5.	Study material on //fileserver2

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS112	**Semester: ODD**	**Semester: I Session** 2018 -2019 **Month from: July-Dec**
Course Name	Machine Learning and Data Mining Lab		
Credits	1	**Contact Hours**	**2**

Faculty (Names)	**Coordinator(s)**	Bharat Gupta
	Teacher(s) (Alphabetically)	Bharat Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
C173.1	Understanding basic syntax in Python	Understanding Level (C2)
C173.2	Understanding Control Flow and looping in Python	Understanding Level (C2)
C173.3	Apply and Compare different classification techniques, Logistic Regression e.g., k-Nearest Neighbours, Support Vector Machine, etc.	Apply Level (C3)
C173.4	Apply clustering techniques k-Means on a dataset	Apply Level (C3)
C173.5	Apply dimensionality reduction technique e.g. PCA on a dataset.	Apply Level (C3)
C173.6	Analyse the real world problem to identify the appropriate data science techniques for classification, clustering and Association rules	Analyse Level (C4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Python basic syntax	Practicing basic python commands	CO1
2.	Control Flow and looping in Python	1. Write a python program that displays the sum of all digits for a user entered number. 2. Write a python function leap_year that prints all the leap years between ranges. The user will enter lower and upper year boundary inside the function. 3. Write a program that outputs all possible strings formed by using the characters a, c, t, o, and g. a particular character can appear only once and all the characters should be used in the formation of string. 4. Write a python script that takes input from file representing a paragraph, and writes to a file named out.txt with all the stop words (a, an, the) removed. 5. Write a recursive function in python to print a Fibonacci series. The Fibonacci sequence is the series of numbers: 0,1,1,2,3,5,8,13,21,34,…etc 6. Write a program for sorting the integer data by using quick	CO1

		sort.	
3.	K-NN	Implement the KNN (K Nearest Neighbours) algorithm in python. Your program should have different functions as follows: 1. HandleData: Open the dataset from CSV and split into test/train (datasets). A ratio of 67/33 for train/test is a standard ratio used for splitting data. 2. Similarity: Calculate the distance between two data instances. The Euclidean distance is used for calculating the difference. It is defined as the square root of the sum of the squared differences between the two arrays of numbers. Only first 4 attributes are used for calculating the distance. 3. Neighbours: Locate k most similar data instances. 4. Response: Generate a response from a set of data instances. It is a function for getting the majority voted response from a number of neighbors. It devises a predicted response based on those neighbors. 5. Accuracy: Summarize the accuracy of predictions. An easy way to evaluate the accuracy of the model is to calculate a ratio of the total correct predictions out of all predictions made, called the classification accuracy. 6. Main: Take split = 0.67, k=3.	CO3
4.	Weka Toolkit	1. Apply the KNN algorithm in Weka tool on the iris dataset. Compare the results of your implemented algorithm with algorithm of Weka tool. 2. Implement the linear Regression. The data will be taken as input from the file. Select the appropriate dataset from the website https://archive.ics.uci.edu/ml/index.php". Justify the reason why the dataset has been selected. b) Apply the Linear regression in Weka tool on the same dataset. Compare the results of your implemented algorithm with algorithm of Weka tool.	CO3
5.	Clustering	Remove the label column of the Parkinson_dataset.csv dataset and implement the following: a) Perform K-Means clustering and Hierarchical clustering. b) Use Manhattan distance c) Use Average merging Strategy in Hierarchical clustering. d) Use three different K values in K-Mean clustering. e) Validate using RMSE and compare both the techniques.	CO4
6	Logistic regression and SVM	Divide the Parkinson_dataset.csv dataset in training and testing dataset randomly and implement the following: a. Classify the disease using Logistic regression and SVM b. Find out the accuracy of classification Model. c. Perform 5-fold cross- validation. d. Compare the result of both techniques using matplotlib.	CO3
7	scikit-learn toolkit	Implementation of the following algorithms in scikit-learn a. Principal components analysis (PCA) b. Decomposing signals in components (matrix	CO5

		factorization problems) c. K-means	
8	Mini Project	1. Specify the broad topic of your mini project based on the Machine Learning and Data mining. 2. Study minimum 6 quality research papers based on the selected topic. 3. Do the SWOT analysis of selected research papers/reports. 4. Identify the research problem. 5. Propose your novelty/improvement in terms of algorithm/new feature. 6. Design the architecture for the proposed problem. 7. Design the test bed. 8. Design a set of experiments to be carried out for the proposed problem. 9. Perform the experimental analysis (in Python language only). 10. Prepare your report. 11. Write a short research paper based on your contribution.	CO6

Evaluation Criteria

Components	Maximum Marks
Lab Test1	20
Lab Test2	20
Mini Project, Regularity, performance	60
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Jiawei Han, Micheline Kamber, Data Mining, Morgan Kaufmann Publishers,Elsevier,2005
2.	Kimball R. and Ross M ,The Data Warehouse Toolkit", Wiley
3.	Pujari, Arun K,Data mining and statistical analysis using SQL, Universities press
4.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining
5.	Soumen Chakrabarti, Mining the Web: Discovering knowledge from hypertext data", Morgan Kaufmann, Elsevier
6.	Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, Prentice Hall,2003
7.	Mattison R. ,Web Warehousing and Knowledge Management", Tata McGraw-Hill.
8.	David Hand, Heikki Mannila and Padhraic Smyth ,Principles of Data Mining,PHI
9.	Transactions on Database Systems (ACM)
10.	IEEE Transactions on Knowledge & Data Engineering
11.	The VLDB Journal The International Journal on Very Large Data Bases

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS113	**Semester** … **Odd**	**Semester** ... **Session** 2018 -2019 **Month from July to Dec, 2018**
Course Name	**Cloud Technology Lab**		
Credits	1	**Contact Hours**	2 Hours

Faculty (Names)	**Coordinator(s)**	Dr Prakash Kumar
	Teacher(s) (Alphabetically)	Dr. Prakash Kumar

COURSE OUTCOMES		**COGNITIVE LEVELS**
C171.1	Demonstrate the architecture and layers of Cloud Service Models, Deployment models etc.	Understand (level 2)
C171.2	Understand the working of CloudSim and run different scheduling alogorithms.	Apply (level 3)
C171.3	Analyze various Scheduling algorithms and compare their performances	Analyze (level 4)
C171.4	Apply and evaluate the energy aware algorithms for using DVFS techniques.	Evaluate (level 5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	CloudSim installations and Use	Create Virtual Machines (VMs) on CloudSim.	CO1
2.		Allocate different Cloudlets to VMs and Data Centers using different scheduling algorithms	CO2
3.	Analyze various Scheduling algorithms in different scenarios on cloudsim	Create different Data Centers and allocate the VMs to them and analyze the outcomes	CO3
4.		Assign the cloudlets and change the scheduling techniques for various scenarios	CO3
5.	Evaluate Energy Aware Simulations using DVFS	Apply and evaluate energy aware algorithms using DVFS techniques	CO4
***n*.**	…	…	…

Evaluation Criteria

Components	**Maximum Marks**
Lab Test# 1	20
Lab Test# 2	20
D2D work	60
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	K. Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing- From Parallel Processing to the Internet of Things", Morgan Kauffman Publishers, Elsevier.
2	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'REILLY publication.
3	"Virtualization Overview", White paper, VM Ware.
4.	Rodrigo N. Calheiros, Rajiv Ranjan, Anton Beloglazov, Cesar A. F. De Rose, and Rajkumar Buyya, CloudSim: A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms, Software: Practice and Experience, Volume 41, Number 1, Pages: 23-50, ISSN: 0038-0644, Wiley Press, New York, USA, January 2011.
5.	Tom Guérout, Thierry Monteil, Georges Da Costa, Rodrigo Neves Calheiros, Rajkumar Buyya, Mihai Alexandru, Energy-aware Simulation with DVFS, Simulation Modelling Practice and Theory, Volume 39, No. 1, Pages: 76-91, ISSN: 1569-190X, Elsevier Science, Amsterdam, The Netherlands, November 2013.
6.	Rajkumar Buyya, Rajiv Ranjan and Rodrigo N. Calheiros, Modeling and Simulation of Scalable Cloud Computing Environments and the CloudSim Toolkit: Challenges and Opportunities, Proceedings of the 7th High Performance Computing and Simulation Conference (HPCS 2009, ISBN: 978-1-4244-4907-1, IEEE Press, New York, USA), Leipzig, Germany, June 21 - 24, 2009. **- Keynote Paper.**

Detailed Syllabus
Lecture-wise Breakup

Course Code	**18M12CS117**	**Semester (Odd)**	**Semester** I **Session** 2018 -2019 **Month from July - December**
Course Name	Blockchain Technology and Applications		
Credits	03	**Contact Hours**	(L+T) (3+1)

Faculty (Names)	**Coordinator(s)**	Dr. P. Raghu Vamsi
	Teacher(s) (Alphabetically)	Dr. P. Raghu Vamsi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C141.1	Understand the structure of a blockchain and why/when it is better than a simple distributed database	Understand Level (Level 2)
C141.2	Analyze the incentive structure in a blockchain based system and critically assess its functions, benefits and vulnerabilities	Evaluate Level (Level 5)
C141.3	Evaluate the setting where a blockchain based structure may be applied, its potential and its limitations	Apply Level (Level 3)
C141.4	Attain awareness of the new challenges that exist in monetizing businesses around blockchains and smart contracts	Analyze Level (Level 4)
C141.5	Describe and apply the differences between the most prominent blockchain structures and permissioned blockchain service providers, as well as rising alliances and networks	Apply Level (Level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Blockchain Basics	What is Blockchain (BC), public ledgers, BC as public ledgers; BC history - Bitcoin and Cryptocurrency, BC 2.0, Smart contracts; BC architecture – Blocks in BC, transactions and distributed consensus; BC conceptualization - The Chain and the Longest Chain, Cryptocurrency to Blockchain 2.0, Permissioned Model of Blockchain.	4
2.	Cryptographic Primitives	Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency	5
3.	Distributed Consensus	Distributed consensus in open environments, Consensus in a Bitcoin network; Bitcoin Consensus - Proof of Work (PoW) – basic introduction, Hashcash PoW, Beyond Consensus in Bitcoin - Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time; Consensus in Bitcoin (The Miners) - The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.	6
4.	Smart contracts – 1	Smart contracts, Solidity, REMIX IDE, Ethereum Blockchain, Ethereum Virtual Machine.	8
5.	Smart contracts – 2	Decentralized applications (Dapps), Truffle development, Design improvements, Application models and standards	7

6.	Use cases	Blockchain for Voting, Government Use-cases – Public distribution system, Blockchain for Tax Payments, Blockchain for Managing Land Registry Records	3
7.	Other Blockchain frameworks	IBM Hyperledge fabric	7-10
9.	Research aspects in Blockchain	Consensus protocols, Identity management, Strong and weak synchronization, avoiding forks, Mining improvements.	3
		Total number of Lectures	42-45

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Drescher, Daniel. "Blockchain basics", Apress, 2017.
2.	Mougayar, William. "The business blockchain: promise, practice, and application of the next Internet technology", John Wiley & Sons, 2016.
3.	Dannen, Chris. "Introducing Ethereum and Solidity", Berkeley: Apress, 2017.
4.	Prusty, Narayan. "Building Blockchain Projects", Packt Publishing Ltd, 2017.
5.	Pilkington, Marc. "Blockchain technology: principles and applications" Research handbook on digital transformations, 2016.
6.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.
7.	Swan, Melanie, "Blockchain: Blueprint for a new economy", O'Reilly Media, Inc., 2015.
8.	Antonopoulos, Andreas M. "Mastering Bitcoin: unlocking digital cryptocurrencies", O'Reilly Media, Inc., 2014.

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**17M1NCI131**	**Semester Odd (specify Odd/Even)**	**Semester – 2nd Month from Jul to Dec**
Subject Name	Flexible Computer Networks		
Credits	**3**	**Contact Hours**	**3**

Faculty (Names)	**Coordinator(s)**	1. Sangeeta Mittal
	Teacher(s) (Alphabetically)	1. Sangeeta Mittal

Course Outcomes

CO#	Course Outcome	Cognitive Level (Bloom's Taxonomy)
1.	Explain the current network-traffic characteristics and modern networking scenarios	Understanding (level - 2)
2.	Assess limitations of classical networking techniques in supporting recent applications	Analyzing (level-4)
3.	Explain Software Defined Network architecture, need and concepts	Understanding (level - 2)
4.	Experiment with Openflow based southbound API in Mininet emulator	Applying(level-3)
5.	Evaluate SDN using Pox and OpenDaylight SDN Controllers	Evaluating(level-5)
6.	Build traffic engineering modules for load balancing, quality of service and multicast data transport in SDN	Creating(level-6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Modern Networking Elements	Fast Ethernet , Gigabit WiFi, 4G/5G Cellular , Cloud Computing , IoT	3
2.	Basics of Modern Network Traffic	Types of Network Traffic, Real time characteristics, Big Data, Cloud Computing and Mobile Traffic , QoS and QoE – Difficulties in achieving them	4
3.	Drivers and Components of Flexible Networking	Evolving Requirements SDN and NFV	2
4.	Introduction to Software Defined Network (SDN)	Architecture , Characteristics, Standards, Open Development Initiatives	3
5.	SDN Data Plane and Open Flow	Data Plane Functions, OpenFlow logical network Device – Flow Tables, Group Tables, Openflow Protocol	6
6.	SDN Control Plane	Control Plane Architecture , OpenDaylight Project – Architecture and APIs	6
7.	SDN Application Plane	Application Plane Architecture, Data center networking and Information center networking over SDN	6
8.	Network Function Virtualization (NFV) – Concepts	Virtualization Approach, NFV use cases, NFV and SDN	4

9.	NFV Infrastructure	Virtualized Network Functions, Virtual LAN, Virtual Tenant Network	6
		Total number of Lectures	**40**

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M21CS111	**Semester Odd**	**Semester I Session 2018_2019** Month from July 2018 to Dec 2018
Course Name	Cloud Based Big Data Systems I		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr Parmeet Kaur
	Teacher(s) (Alphabetically)	1. Dr Parmeet Kaur

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO111.1	Outline the concept and challenge of big data and how cloud technology is useful to store or analyze the big data	Outline Level 2
CO111.2	Compare techniques of big data distribution in clouds – Partitioning and Replication.	Compare Level 4
CO111.3	Outline Hadoop architecture and MapReduce framework.	Outline Level 2
CO111.4	Explain Cloud NoSQL- Cassandra architecture, transaction processing and repair mechanisms for big data storage.	Explain Level 2
CO111.5	Apply Cassandra CQL commands to define, query and manipulate a NoSQL database.	Apply Level 3
CO111.6	Design and develop a simple application and connect with a NoSQL database, NewSQL database or Hadoop distributed file system. [Level 6]	Design Level 6

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Database Systems and Cloud Computing	Overview of Database Management Systems ,Basic principles of cloud computing, Classifying cloud services, and Basic terms and principles of DaaS (Database as a Service)	4
2.	Data Distribution: Partitioning and Replication	Data partitioning and replication techniques,Consistent Hashing, and Implementing highly available, scalable, and network partition tolerant cloud databases	6
3.	Trade-offs in Cloud Databases	Differences between conventional (relational) databases and cloud databases ACID database properties, CAP Conjecture, and BASE properties of cloud databases, NewSQL	4
4.	SQL based Cloud Databases	SQL compliancy, Transaction Control, Elasticity & Scalability. Case Study: nuoDB/ DB as a service	6
5.	Cloud NoSQL Databases	*Cloud Data Models*: Key-Value data model, Document data model, Column Family data model. Graph Data Model	2
6.	Cassandra Architecture and Cassandra Data	Internode Communication ,Data Distribution and Replication ,Partitioning , Snitches ,Basic features of Cassandra CDBMS, Formal definition of Cassandra column	6

	Model	family data model, Cassandra CQL query language and CQL data model: Key space, Table definition, Column, and Data Types	
7.	Cassandra Consistency Levels	Configuring Data Consistency -Write Requests, Read Requests	3
8.	Cassandra Repair Mechanisms , Transaction Processing	Hinted Handoff Writes, Anti-entropy Node Repair, Transactions and Concurrency Control, Light Weight Transactions	5
9.	Cassandra CQL Queries	The Syntax of the SELECT Statement Simple SELECT expressions ,Filtering Data using WHERE Clause ,Using Indexes ,Filtering Collections , Querying Tables with Columns of the counter Type Keyspace Design Heuristics	6
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Class Assignments:10, Project: 10, Attendance:5)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Furht B., Villanustre F. (2016) Introduction to Big Data. In: Big Data Technologies and Applications. Springer, Cham
2.	Li, Kuan-Ching, Hai Jiang, Laurence T. Yang, and Alfredo Cuzzocrea, eds. *Big data: Algorithms, analytics, and applications*. CRC Press, 2015.
3.	Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. *Mastering cloud computing: foundations and applications programming*. Newnes, 2013.
4.	Zomaya, Albert Y., and Sherif Sakr, eds. *Handbook of big data technologies*. Berlin: Springer, 2017.
5.	Sullivan, Dan. *NoSQL for mere mortals*. Addison-Wesley Professional, 2015.
6.	Lam, Chuck. *Hadoop in action*. Manning Publications Co., 2010.

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M22CS123	**Semester: (specify Odd/Even)**	**Semester** ODD **Session** 2018-2019 **Month from** June 18 **to** Dec 18
Course Name	Natural Language Processing and Understanding		
Credits	3	**Contact Hours**	3-0-0

Faculty (Names)	**Coordinator(s)**	Dr. Shikha Jain
	Teacher(s) (Alphabetically)	Dr. Shikha Jain, Mr. Vimal Kumar

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Preprocess the natural language text through tokenization, lemmatization, stop-word removal and morphological analysis.	Apply (Level 3)
CO2	Apply and analyze various language models for data representation.	Analyze (Level4)
CO3	Select and apply various part-of-speech (POS) tagging approaches.	Apply (Level 3)
CO4	Apply non-probabilistic and probabilistic parsing techniques for checking the syntax of the natural language text.	Apply (Level 3)
CO5	Apply and analyze various contextual analysis techniques for meaningful information extraction.	Analyze (Level4)
CO6	Design and evaluate various NLP applications such as topic modelling, text classifications, word prediction, question answering system and machine translation.	Evaluate (Level 5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction	Intro to NLP, Challenges & Requirements	01
2.	Preprocessing	Tokenization, Lemmatization, Stop word removal, Morphological analysis	01
3	Word embedding	Word embedding and language models: N-gram, Vector representations (one hot vector, Bag of word, co-occurrence matrix), Word Embedding (word2vec : CBOW, skipgram; Glove), Advanced word vector representations (softmax, single layer networks);	07
4	Part of Speech Tagging	Hidden Markov Models, Maximum Entropy Markov Models & Conditional Random Fields; Smoothing;	05
5	Parsing	Context Free Grammars, Non-probabilistic Parsing, Probabilistic Parsing	05

6	Applications - I	Graph-based Methods for NLP Applications;	03
7	Unsupervised Language Discovery	Statistical Models of Semantics and Unsupervised Language Discovery: resolving ambiguity; Language modeling and Naive Bayes	04
8	Supervised Language Discovery	Supervised Language Discovery: text classification	02
9	Topic Modeling	LSI, PLSI, LDA	03
10	Applications - II	Word prediction: LSTM	04
		The pragmatics of questions and answers: Partition semantics and decision-theoretic;	02
11	Machine Translation	IBM model 1, 2 and 3	03
12	Case Study	Case Study: Apple Siri/ Amazon Alexa/ IBM Watson	02
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Handbook of Natural Language Processing & Machine Translation by Olive, Joseph, Christianson, Caitlin, McCary, John (Eds.), Springer
2.	Natural Language Understanding by James Allen, Benjamin Cummins Publisher
3.	Foundations of Statistical NLP by Hinrich Schtze, Christopher D. Manning
4.	Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition (second edition) D. Jurafsky and J. Martin
5.	Natural Language Processing with Python by Steven Bird, Ewan Klein, and Edward Loper

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M11CS121	**Semester** ODD **(specify Odd/Even)**	**Semester** Ist **Session** 2018 -2019 **Month from** July 2018- December 2018
Course Name	E-Commerce and Social Web		
Credits	3-0-0	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Dr. Sandeep Kumar Singh
	Teacher(s) (Alphabetically)	…

COURSE OUTCOMES		**COGNITIVE LEVELS**
C120.1	Compare and categorize different commercial models of E-commerce.	Understand Level (Level 2)
C120.2	Design and develop marketing strategies based on interactions and insights from Social web to enhance revenue promote brand and reach out to customers.	Create Level (Level 6)
C120.3	Make Use of Open source API s from various social networking sites.	Apply Level (Level 3)
C120.4	Outline suggestions and recommendations for Social Shopping.	Understand Level (Level 2)
C120.5	Measure the effect of different Social media marketing strategies using Social Media metrics.	Apply Level (Level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction and overview of e-Commerce	Definition and models of e-Commerce and examples. Selection of an E-commerce type and business model. Business models based on (1) Transaction Parties (2) Transaction Types. Case Studies of Indian context.	3
2.	Introduction to Social Web	Social Media : An Overview, Social Media Analytics: An Overview, SOCIAL MEDIA TEXT ANALYTICS, Twitter as Marketing Tool	5
3.	Social Web Landscape	Social Web overview, data-types, format, Text cleaning, tagging and storage, Social media techniques, tools and platforms, data visualization of data, research, applications and challenges in social Web.	3
4.	Introduction to Social e- Commerce	Introduction to Social Commerce, Supporting Theories and Concepts for Social Commerce, Tools and Platforms for Social Commerce	3
5.	Social Web Analysis	Analyzing Social web, Nodes, Edges and Network measures, Centrality, Power and Bottlenecks, Concept of Cliques, Clusters and Components, Viral marketing, Graph data in real world, Business use of Social web, Privacy in Social web, Influencer Outreach	5
6.	Social Shopping and Social Marketing	Social Media Marketing, Social Shopping: Concepts, Benefits, and Models, Customer Engagement and Metrics, Basic Social Marketing Strategies- Physical goods, Digital goods, Services, Affiliate Marketing, Guerrilla Marketing	5
7.	Programming using	Introduction to OAuth protocol, Programming and Crawling Social media using Twitter 4j Facebook API, LinkedIn API ,	6

	API and RSS feeds	Google +, Reddit, API, Instagram API	
8	Twitter and Face book Data Analytics for Viral Marketing	Topic-based Clusters in Egocentric Networks on Facebook, Changes in Tie Strength Through Site Use on Facebook, Patterns of Responses to Resource Requests on Facebook, Exploring requests for help on Facebook, Analysis of User-Generated Content on Facebook, Predicting Clicks on Ads,Predicting the quality of new contributors to the Facebook crowdsourcing system	8
9.	Social Search Engine Optimization	Optimizing for Web Search, Using Photo-Sharing Sites for SEO, Optimizing for Social Search Engines	6
10.	Creating Suggestions and Recommendations	Perform web-market segmentation, making recommendations: collaborative filtering and content based filtering approaches, creating suggestions and building recommendation engines, Understanding recommendation engines based on users, items, and content, Finding recommendations about friends, articles, and news stories, Creating recommendations for sites similar to Netflix	6
		Total number of Lectures	**45**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments and Attendance)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Michael P Papazoglou and Pieter M.A. Ribbers, " e-Business- Organizational and technical foundation" , John Wiley and Sons, 2006.
2.	Efraim Turban , David King, Dennis Viehland, Jae Lee, "Electronic Commerce A Managerial Perspective 2006", 4ed, Pearson Education International edition, 2006.
3.	Stephen Chen, "Strategic management of e-business", second edition, John Wiley and Sons, 2005.
4.	RS Prasad, "Cyber crime: An Introduction", ICFAI Books, ICFAI University, 2004.
5.	RS Prasad, "Cyber crime: Combat Strategies", ICFAI Books, ICFAI University, 2004.
6.	RS Prasad, "CRM Present and Future", ICFAI Books, ICFAI University, 2005.
7.	Elaine Lawrence et al, "Internet commerce – Digital models for Business", John Wiley and Sons, 2003.
8.	Abhijit Choudhury and Jean-Pierre Kuilboer, "E-business and E-Commerece Infrastructure – Technologies supporting E-Business Initiative", McGraw Hill, 2002.
9.	Henry Chan et al, E-Commerece – fundamentals and applications", John Wiley and Sons, 2001.
10.	Programming Collective Intelligence: Building Smart Web 2.0 Applications by Toby Segaran
11.	Algorithms of the Intelligent Web Haralambos Marmanis, Dmitry Babenko
12.	Recommender Systems: An Introduction Dietmar Jannach (Author), Markus Zanker (Author), Alexander Felfernig (Author), Gerhard Friedrich
13.	Recommender Systems Handbook Francesco Ricci (Editor), Lior Rokach
14.	Recommendation Systems in Software Engineering Martin P. Robillard (Editor), Walid Maalej (Editor), Robert J

	Walker (Editor), Thomas Zimmermann
15.	Web Analytics 2.0 Avinash Kaushik
16.	Analyzing Social Web Jeneffir Golbeg
17.	Predictive Analytics Eric Segel

Syllabus Description

Course Code	17M12CS115 (C142)	**Semester** Odd	**Semester** 3rd **Session** 2019 - 2020 **Month from** July **to** December
Subject Name	3D Graphics and Animation		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator**	Dr. Suma Dawn
	Teacher(s)	Dr. Suma Dawn

COURSE OUTCOMES		**COGNITIVE LEVELS**
C142.1	Explain the theories of 3D objects and various media environments.	Understanding Level (Level 2)
C142.2	Propose solutions to given case studies by illustrating various methods and environments related to 3D graphics such as geometry, transformations and modeling, visibility detection, lighting, illumination, etc.	Creating Level (Level 6)
C142.3	Create multimedia-rich content, specifically comic frames and animations.	Creating Level (Level 6)
C142.4	Design dynamic and interactive animations using scripting to implement fun games and create richer content.	Creating Level (Level 6)
C142.5	Critique and compare various advanced animation principles such as rigid body dynamics, natural phenomena and modelling, 3D object manipulation, etc.	Evaluating Level (level 5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction	Fundamentals of 2D and 3D graphics and Animation Designing	1
2.	3D Graphics	3D Primitives, Geometry, transformations and Modeling; Visibility Detection; Lighting, Illumination, and Shading, Texture Mapping; Sub-division Surfaces, Implicit surfaces and voxels, creating complex geometry; Imaging and Rendering. Related Programming, 2D and 3D object creation	22
3.	Animation	Fundamentals; Motion Creation, Animating articulated structures, kinematics and inverse kinematics; Creation of simple animation with and without actionscripting.	17
4.	Introduction to Advanced Animation and Principles.	Physically based modeling and simulation, rigid body dynamics; Natural Phenomena and Modeling (plants, arms, etc), and other Simulation; 3D object manipulation, Visualization and other advanced algorithms and topics.	2
		Total number of Lectures	**42**

Evaluation Criteria	**A. THEORY Examination**	**Marks**
	I. Test1	20
	II. Test2	20
	III. End Term	35

	B. Internal - including Assignments, Quizzes, attendance	25
	Total	100

Recommended Reading material: (APA format)	
1.	Parent, R. (2012). *Computer animation: algorithms and techniques*. Newnes.
2.	Walnum, C. (1995). *3-D Graphics Programming with OpenGL*(Vol. 1, p. 996). Que Corporation.
3.	Buss, S. R. (2003). *3D computer graphics: a mathematical introduction with OpenGL*. Cambridge University Press.
4.	Giambruno, M. (2002). *3D graphics and animation*. New Riders Publishing.
5.	Rogers, D. F. (2000). *An introduction to NURBS: with historical perspective*. Elsevier.
6.	Newman, W. M., & Sproull, R. F. (1979). *Principles of interactive computer graphics*. McGraw-Hill, Inc..
7.	Watt, A., & Policarpo, F. (2005). *Advanced game development with programmable graphics hardware*. AK Peters/CRC Press.
8.	Ferguson, R. S. (2013). *Practical algorithms for 3D computer graphics*. AK Peters/CRC Press.
9.	Pakhira, M. K. (2010). *Computer Graphics, Multimedia and Animation*. PHI Learning Pvt. Ltd..
10.	Perkins, T. (2007). *Adobe Flash CS3 Professional Hands-On Training*. Peachpit Press.
11.	Springer's Multimedia Tools and Applications
12.	IEEE Transactions on Multimedia
13.	ACM Transactions on Multimedia Computing, Communications and Applications
14.	Interactive Multimedia Electronic Journal of Computer-Enhanced Learning.

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M17CS211	**Semester Odd 2018 (specify Odd/Even)**	**Semester 3rd Session** 2018 -2019 **Month from July to Dec**
Course Name	Project Based Learning – III		
Credits	4	**Contact Hours**	

Faculty (Names)	**Coordinator(s)**	Mahendra Kumar Gurve
	Teacher(s) (Alphabetically)	Mahendra Kumar Gurve, Sonal

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Understand the Software Development Automation processes and work collaboratively in a small team to develop a project on software development automation.	Understanding Level (Level II)
CO2	Conduct preliminary literature Review, study different automation tools and find vulnerabilities in the studied literature/tools.	Understanding Level (Level II)
CO3	Analyze and identify the various frameworks, APIs , libraries and tools used for project/ software implementation.	Analyzing Level (Level IV)
CO4	Design Software Development Automation software using required frameworks, APIs and libraries.	Applying Level (Level III)
CO5	Evaluate and validate developed project with respect to various software automation frameworks.	Evaluating Level (Level V)
CO6	Prepare technical detailed report detailing the problem statement, proposed methodology, software specification, design, test plan, and implementation details.	Creating Level (Level VI)

i) Each fortnightly assessment - 8
(First assessment will be at the end of 3rd week from the beginning of the semester and thereafter fortnightly assessment. A total of six assessments giving a total percentage
6 x 8 = 48) = 48
(ii) Report at the end of the semester - 10
(iii) Semester end presentation by the students - 10
(iv) Viva-voce at the end of the semester - 16
(v) Peer group evaluation (i.e. evaluation by the fellow students not belonging to the same batch)-8
(vi) Self assessment by the student concerned (can be - 8 moderated by the instructor)
TOTAL=100

Detailed Syllabus
Lecture-wise Breakup

Course Code	17M17CS212	**Semester Odd 2018 (specify Odd/Even)**	**Semester 3rd Session** 2018 -2019 **Month from July to Dec**
Course Name	Seminar and Term Paper		
Credits	4	**Contact Hours**	

Faculty (Names)	**Coordinator(s)**	Kavita Pandey
	Teacher(s) (Alphabetically)	Kavita Pandey

COURSE OUTCOMES		**COGNITIVE LEVELS**
C212.1	Summarize the literature around a significant research problem in the field of Computer Science	Understand (level 2)
C212.2	Analyze the research articles from a deeper perspective and examine the research gaps	Analyze (level 4)
C212.3	Improve the communication and writing skills by compiling the findings in the form of report and seminar	Evaluate (level 6)

Evaluation Criteria

Components	**Maximum Marks**
Day to day work prior to Midterm	20
Mid term Seminar and Report	20
Day to day work after Midterm	20
End term Seminar	20
Term Paper	20
Total	**100**