Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	CS-606	**Title of the Course**	Advance Cloud Computing	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**4**	**0**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	Private or public, the goal of cloud computing is to provide easy, scalable access to computing resources and IT services						

Course Outcomes	
CO1	Apply his knowledge to develop a cloud environment using hardware and software virtualization techniques and perform Map Reduce job execution
CO2	Use common cloud services and components of Hadoop ecosystem in order to solve a real world problem.
CO3	Utilize the SOA and MVC techniques, classify and cluster Big Data and able to develop a recommendation system
CO4	Develop highly secured and high performance cloud applications.
CO5	Develop a research attitude in emerging fields of cloud computing and write Quality research papers.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Cloud Computing	Introduction to Cloud Computing :Definition(s) of Cloud Computing, Characteristics of Cloud, Cloud Deployment Models, Cloud Service Models, Driving Factors and Challenges of Cloud and Overview of Applications of Cloud. Cloud Concepts & Technologies: Virtualization, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring, MapReduce, Identity and Access Management, Service Level Agreements and Billing.	8	1
2	Cloud Services and Platforms, Hadoop & MapReduce	Cloud Services and Platforms :various types of cloud services including compute, storage, database, application, analytics, network and deployment services. Hadoop & MapReduce: Overview of Hadoop echo system, MapReduce architecture, MapReduce job execution flow and MapReduce schedulers	8	2
3	Cloud Application Design, Big-Data Analytics	Cloud Application Design: cloud application design considerations, cloud application reference architectures, design methodologies such as SOA, CCM and MVC, data storage technologies and cloud deployment approaches. Big-Data Analytics: big data analytics approaches: approaches for clustering big data, approaches for classification of big data and recommendation systems	8	3
4	Cloud Application Benchmarking & Tuning:	Cloud Security: Cloud security challenges, approaches for authorization authentication, identify & access management, data security, data integrity encryption & key management. Cloud Application Benchmarking & Tuning: cloud application workload characteristics, performance metrics for cloud applications, cloud application testing, performance testing tools and a load test and bottleneck detection case study.	8	4
5	Cloud Computing Case-Studies	Cloud Computing Case-Studies: Review of Technical papers from Major journals (IEEE Transactions) and major conferences (IEEE / Springer etc.) on Cloud Computing / Software Engineering / Other Thrust Areas and Presentations by Students on their understanding of the same, after reviewing the papers concerned	8	5

Reference Books:

CloudComputingAHands-onApproachbyA.Bagha&V.Madisetti[ISBN:978-81-7371-923-3]Published by University Press, pp. 456, Printed in2014

e-Learning Source:

https://onlinecourses.nptel.ac.in/noc20_cs20/preview

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	3	1	2	1	3	1	2	1	2	1	2	2
CO2	3	2	1	1	1	2	3	2	2	2	3	1	3	2	2
CO3	2	2	2	2	1	1	3	2	3	1	1	2	2	1	2
CO4	3	2	1	2	3	1	1	3	2	2	3	3	2	3	1
CO5	1	2	2	3	1	2	1	3	1	2	1	2	1	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	CS-608	**Title of the Course**	Advance Mobile Computing	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	III	**4**	**0**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives							

Course Outcomes	
CO1	To understand and compare the various wireless communication technologies.
CO2	To visualize the various important steps in GSM communication.
CO3	To specify and identify the requirement the mobile IP and Transport Protocol.
CO4	To examine and simulate the important aspects of Mobile Adhoc Networks.
CO5	To apply the knowledge gained to design and develop a mobile application.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Wireless Communication	Introduction to Wireless Communication: Application, Frequencies for radio transmission, Signals, Antennas, Signal propagation,Path loss of radio signals, additional signal propogation effects, Multi path propogation. Multiplexing: Space division multiplexing, Frequency division multiplexing, Time division multiplexing, Code division multiplexing, Modulation: Amplitude shift keying, Frequency shift keying, Phase shift keying. Spread spectrum: Direct sequence spread spectrum, Frequency hopping spread spectrum, Cellular systems	8	1
2	Channel Allocation	Channel Allocation: Motivation for a specialized MAC, Hidden and exposed terminals, Near and far terminals, SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Multiple access with collision avoidance. Code division multiple access.	8	2
3	Telecommunications systems	Telecommunications systems: GSM: Mobile services, System architecture, Radio sub system, Network sub system, Operation subsystem. Radio interface, Logical channel and frame hierarchy. Localization and calling: MOC and MTC, Handover, Security: Authentication, Encryption. General Packet Radio Service (GPRS) Satellite systems: History, Applications, Basics of GEO, LEO and MEO, Routing, Localization, Handover	8	3
4	Wireless LAN	Wireless LAN: Advantages and disadvantages of WLAN. Infrared vs radio transmission, Infrastructure and ad- hoc network, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer: DFWMAC-DCF using CSMA/CA, DFWMAC-DCF with RTS/CTS. MAC management: Synchronization, Power management, roaming. Bluetooth: User scenarios, Architecture. WiMAX: Layer Architecture	8	4
5	Mobile network layer	Mobile network layer: Mobile IP: Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6, Dynamic host configuration protocol. Mobile Adhoc network: architecture, Distance vector routing, Adhoc on-demand distance vector routing and dynamic source routing.Security Issuues in mobile computing: Introduction, Information Security, Security Techniques, Security Protocols, Public key Infrastructure.	8	5

Reference Books:

Jochen Schiller, " Mobile Communications, Pearson Education, 2nd Edition, 2003.

Dharma Prakash Agrawal & Qing-An Zeng " Introduction to Wireless & Mobile Systems", Thomson Brooks/Cole, 2nd Edition 2003.

Krzysztof Wesolowski, "Mobile Communication Systems ", John Wiley & Sons, Ltd.

Ron Olexa, "Implementing 802.11, 802.16 and 802.20 Wireless Networks, Elsevier

e-Learning Source:

https://nptel.ac.in/courses/106106182

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4
CO1	3	3	2	1	1	3						3	1	1	
CO2	3	3	3	2	1	1						2			3
CO3	3	2	1	1	2	2	3					3	2		3
CO4	3	2	2	2	3	3						2		4	
CO5	3	1	1	1	1	2	1					2	1		4

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	**CS-609**	**Title of the Course**	**Big Data, Subject**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	III	**4**	**0**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	1. To study the basic technologies that forms the foundations of Big Data. 2.To study the programming aspects of cloud computing with a view to rapid prototyping of complex applications. 3.To understand the specialized aspects of big data including big data application, and big data analytics. 4.To study different types Case studies on the current research and applications of the Hadoop and big data in industry						

Course Outcomes	
CO1	Student must be Able to understand the building blocks of Big Data
CO2	Student must be able to articulate the programming aspects of cloud computing(map Reduce etc)
CO3	Student must be able to understand the specialized aspects of big data with the help of different big data applications
CO4	Student must be able to represent the analytical aspects of Big Data
CO5	Student must be know the recent research trends related to Hadoop File System, MapReduce and Google File System etc

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	Data structures in Java	Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept ofSerialization	**8**	**1**
2	Working with Big Data	Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop(Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local,Pseudo-distributed mode, Fully Distributed mode), Configuring XML files	**8**	**2**
3	Writing MapReduce Programs	Understanding Hadoop API for MapReduce Framework, Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner	**8**	**3**
4	Hadoop I/O	The Writable Interface, WritableComparable and comparators, Writable Classes: Writablewrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators	**8**	**4**
5	Pig and hive	Pig Architecture, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces. Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.	**8**	**5**

Reference Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly, Hadoop in Action byChuck Lam, MANNING Publ.
3. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

e-Learning Source:

https://onlinecourses.nptel.ac.in/noc20_cs92/preview

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	–	–	–	–	–	–	–	–	2	2
CO2	2	2	1	1	1	–	–	–	–	–	–	–	–	2	2
CO3	2	2	1	2	1	–	–	–	–	–	–	–	–	2	2
CO4	2	2	1	2	1	–	–	–	–	–	–	–	–	2	2
CO5	2	2	2	3	2	–	–	–	–	–	–	–	–	2	2

2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	CS-611	**Title of the Course**	PROGRAMMING LAB	**L**	**T**	**P**	**C**
Year	II	**Semester**	III	**3**	**1**	**0**	**4**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	• To learn the basic concepts and syntax of Python programming. • To be able to develop logics which help them to create programs and applications using Python language. • To learn the use of Python library functions in Python language. • Learn to develop various graphical applications in Python language. • After learning the Python programming they can easily switch over to any other language.						

Course Outcomes	
CO1	Able to understand the basic concepts of Python programming language and their implementation.
CO2	Able to design and develop various programming problems using Python programming concepts.
CO3	Able to analyze and develop programs of varying complexity.
CO4	Able to develop programs on different operations on arrays, matrices & strings.
CO5	Able to develop programs for graphical applications.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Preliminaries	Understand the interpretednatureof Python: Appreciate the fact That to a large extent,Pythonallowsa“ natural” style of programming .Carry out simple tasks using the Python interpretercommandline. onstructsIntroduced: basicdatatypes (string,int,floatetc.), largeintegersinPython,collections(lists) and associative listsandoperationson these;variables,assignment, operators,expressions; basic I /O; numerical computationsusingthe Pythonmathlibrary. Creatingandrunning Python sourcefiles(.py). – ClassExercises: Basic exercises on alltheabove. –Take Home Exercises: Output 3-letter month name given the month number using strings; Convert a date in the d/m/yformat (d, m andy are day month andyear respectively as numbers) to a given(fixed)format; Take the principal amountandthetermofaloanandprinttheEMI.	2	1
2	Control Structures (Loops and Conditionals) and Functions	–Objective:Usecontrolstructures to direct the“flow”of computation.Get abasicunderstanding of modularizationusing functionsanditsroleindealing withcomplexity,maintainabilityandreadabilityofprograms. – Constructs Introduced: if-then-else; while- and for-loops; Iterators on lists. Conditional expressions; Functions and theirarguments. Basic object orienteddot (.)notation. ClassExercises:Pictorialnumbers.Convert an umberin words to numeric. Random Number Generator. –TakeHom eExercises: Binary Search;Simulate aqueue;Find the averageof all the input numbers untilaprompt; Invertastring; Find the square root of numberusingNewtonsmethodwheretheiterative formulaisgiven; Generalization of the pictorial numbers exercise; Convert romannumerals to decimal andvice versa; Answersimplequestions with a fixed structure (e.g.Is the dolphin a mammal?) using an associative list as a “database” of animals withtheirclassification	2	2
3	More Exercises on Loops & Functions. Recursion.	Objective:Getcomfortablewiththe idea thatfunctions cancall themselves.More involvedexercises using loops,functionsandrecursion. –ConstructsIntroduced:Useofrandom.pymodule.Command-linearguments. –ClassExercises:Quicksort.Miller-RabinPrimalityTest. –TakeHomeExercises:CompletetheQuicksortandMiller-RabinPrimalityTest;SolvetheKoenigsburgProblemongraphs;Writeadecoderforatextthathasbeenencryptedusingacaesarcypher.	2	3
4	Object Orientation & GUI Using Python	– Objective:AnelementaryfamiliaritywithOOnotions.Abilitytocreateandworkwithsimple GUIs andgraphics. –ConstructsIntroduced: Classes,wx Pythonlibrary andsomegraphicslibrary likeVPython. –ClassExercises:Geometricshapesandsomesimpleprimitives.Convexhull. –TakeHomeExercises:Operationsonsparsematrices	2	4
5	Installing and working with Latex	Concept of insertingtable,arrays ,contents, references in aresearchpaper using Latex	2	5

Reference Books:

https://elearn.nptel.ac.in/shop/iit-workshops/completed/lab-workshop-fpga-architecture-and-programming-using-verilog-hdl-batch-5/

e-Learning Source:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**1**	**1**	**2**		**3**		**3**						**2**	**1**	**1**
CO2	**1**	**1**	**1**	**2**	**1**		**3**						**2**	**1**	**1**
CO3	**1**	**2**	**2**	**2**			**3**						**2**	**1**	**1**
CO4	**1**	**2**	**2**	**2**			**3**						**2**	**1**	**1**
CO5	**1**	**2**	**1**				**3**						**2**	**1**	**1**

3- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Integral University, Lucknow

Effective from Session: 2017-18							
Course Code	CS612	**Title of the Course**	SIMULATION TOOLS LAB	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	III	**0**	**0**	**2**	**2**
Pre-Requisite	None	**Co-requisite**	None				
Course Objectives	Practicing SCI LAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Helpfiles.						

Course Outcomes	
CO1	1. Learn about soft computing techniques and their applications
CO2	2. Analyze various neural network architectures
CO3	3. Understand perceptrons and counter propagation networks.
CO4	4. Define the fuzzy systems
CO5	5. Analyze the genetic algorithms and their applications.

Sr No.	**Experiments**	**Contact Hrs.**	**Mapped CO**
1	MATRIXCONSTRUCTORSANDOPERATIONSZeros(m,n) – creates m rows with n colsEye(m,n) –createsidentitymatrix Ones(m,n)– createsmatrix withall1'sforall mrowsandncolsrand(m,n) –createsmatrixwithrandomnumbers Max(z) and Min(z)--returnsthelargest andsmallestelement inavector.prod(z) –returns the product of all element sinavector. MATRIXBITWISE,RELATIONAL&LOGICALOPERATIONS	2	1
2	Thestudyon Relationaloperations **(**Relationaloperators:<<=>>===~=) logical operations *a=0;b=10; ifaandb* *disp("Condition is true");else* *disp("Conditionisfalse");* *end* bitwiseoperations U=[001101]; V=[011001]; >>U|V CONTROL STRUCTURES(If-Else, If-elseif–else, Select) Tofindwhetheranumberisanevennumberornot	2	2
3	**To printonwhatdaywearеinaweek** Todeterminewhetheranumberis+veor–veorzero CONTROLSTRUCTURES(for,while, breakandcontinue) Tofind factorialofgivennumber usingforloop **Tofindfactorialofgivennumberusingwhileloop** To find sum of all positive numbers entered by user (enter '0' to terminate) using breakandcontinue GRAPHICS2DPLOTS Plotting a single plot on the graphMultipleplots onthesamegraph SCILAB–ComputerAPPLICATIONPROGRAM(1) WriteaprograminScilabforEdgeDetectionusingDifferentEdgedetectors[1].Sobel[2].Prewitt [3].Log[4].Canny	2	3
4	**ExperimentsbasedonNetworksimulator(NS-2)** 8. Tclscripttocreatefixedwirelessnodes. Tclscript tocreatefixedcolorwirelessnodes.	2	4
5	Tclscripttocreatethedynamicnumberofnodes . (b).Tclscripttocreatethedynamicnumberofnodes andits initiallocation. Tclscripttocreatethedynamiccolorandinitiallocationtonodes. Tclscripttogivemobilitytonodes TclscripttomakeTCPcommunicationbetweennodes	2	5

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**2**	**2**	**1**	**3**	**1**	**2**	**2**	**3**	**1**	**2**	**1**	**2**	**1**	**2**	**3**
CO2	**3**	**1**	**1**	**1**	**1**	**2**	**1**	**2**		**2**	**3**	**1**			**2**
CO3	**1**	**3**	**3**	**2**	**1**			**2**		**1**	**1**	**2**	**2**	**1**	**3**
CO4	**4**	**2**			**3**	**1**	**3**	**3**		**2**	**3**	**3**	**2**		**2**
CO5	**3**	**4**	**1**	**3**	**1**	**2**	**3**	**3**	**1**	**2**	**1**	**2**	**1**	**2**	**3**

1- **Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**