Name of Institute: Indus Institute of Technology and Engineering
Name of Faculty: Ms. Madhvi Bera

Course code: DS0201
Course name: Advance Algorithms
Pre-requisites: Data Structure, Design and analysis of algorithm, Programming concepts

Credit points: 4
Offered Semester: II

Course Coordinator
Full Name: Ms. Madhvi A. Bera
Department with sitting location: CE – Department, Staff Room - 4th Floor Bhanwar Build.
Telephone: 9898891167
Email: madhvibera.ce@indusuni.ac.in
Consultation times: 02.25 PM – 05:00 PM (Wednesday and Friday)
09.00 AM – 05.00 PM (Working Saturdays)

Course Lecturer
Full Name: Ms. Madhvi A. Bera
Department with sitting location: CE – Department, Staff Room - 4th Floor Bhanwar Build.
Telephone: 9898891167
Email: madhvibera.ce@indusuni.ac.in
Consultation times: 02.25 PM – 05:00 PM (Wednesday and Friday)
09.00 AM – 05.00 PM (Working Saturdays)

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

1) Understand and develop a variety of techniques for designing algorithms.
2) Expand advanced algorithm analysis skills for analyzing the approximation ratio of approximation algorithms, parallel algorithm and the probability of randomized algorithms.
3) Gain a high-quality understanding on a wide range of advanced algorithmic problems, their relations and variants, and application to real-world problems.

Course Outcomes (CO)

After successful completion of the course, student will able to:

1. Analyze a variety of algorithms with practical applications and the resource requirements of every one.
2. Establish the most suitable algorithm for any given task and then apply it to the problem.
3. Demonstrate sufficient comprehension of the theory of intractability and prove when certain kinds of problems are intractable.

Course Outline

Unit - 1	**[12 hours]**
Introduction: Basic concept of algorithm, Overview of Divide and Conquer, Greedy Algorithms and Dynamic Programming. Basic search and traversal techniques for graphs, Backtracking, Branch and Bound.	
Unit - 2	**[12 hours]**
Maximum Flow: Flow Networks, Ford-Fulkerson method. **String Matching:** Introduction to string-matching problem, Naïve string matching algorithm, Rabin Karp, Knuth Morris Pratt, Boyer-Moore matching algorithms and complexity analysis. **NP- Hard and NP-Complete Problems:** P, NP and NP-Complete complexity classes, Proof of NP-Completeness.	
Unit - 3	**[12 hours]**
Approximation Algorithms: Introduction, Combinatorial Optimization, approximation factor, Types of approximation algorithm, different examples of approximation algorithm. **Parallel Algorithms:** Introduction, Classification of Parallel System, PRAM Model, parallel algorithm specifications and analysis, Parallel Searching and Parallel Sorting.	
Unit-4	**[12 hours]**
Probabilistic Algorithms & Randomized Algorithms Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms, Game-theoretic techniques.	

Method of delivery
Face to Face Lecture using Black Board, Chalk & Duster

Study time
Two Hours Theory, Two Hours Practical

CO-PO Mapping (PO: Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	2	1	-	-	-	-	-	-	-	-
CO2	-	2	3	3	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)
(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

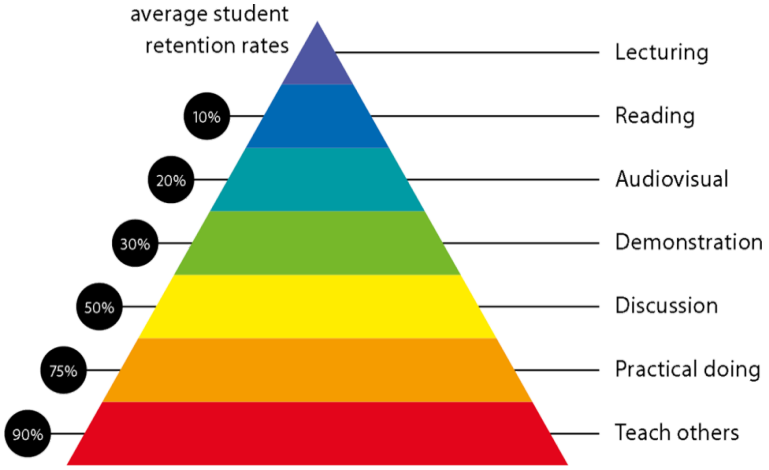

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**

Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

01	Implement algorithm and program for merge sort using divide and conquer strategy.	Basic concept of divide and conquer algorithm
02	Implement algorithm and program for quick sort using divide and conquer strategy.	
03	Implement program for minimum spanning tree using greedy technique.	Greedy Algorithm
04	Implement program for knapsack problem using dynamic programming.	Dynamic programming
05	Implementation of Ford Fulkerson algorithm.	Maximum flow
06	Use following algorithm for string matching: 1. String Matching 2. Naïve String Matching 3. Rabin Karp	String matching
07	Implement program for Knuth Morris Pratt technique.	
08	Implement program for Enumeration Sort using parallel algorithm	Concept of parallel and approximation algorithm
09	Implement program for Odd-Even Transposition Sort using parallel algorithm	
10	Perform Travelling Salesman problem using approximation algorithm.	
11	Implement program for randomized quick sort.	Randomized concept
12	Case Study	

Lecture/tutorial times

Example:

Lecture	Monday	11.00 am – 11.55 am	Room LH 30
Lecture	Tuesday	11.55 am – 12.50 pm	Room LH 30
Lecture	Wednesday	01.30 pm – 02.25 pm	Room LH 30
Practicals	Thursday	09.00 am – 10.50 am	Lab – 3 Main Building

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Text books

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, PHI.
2. Randomized Algorithms: R. Motwani and P.Raghavan

Reference Books:

1. Fundamental of Algorithms by Gills Brassard, Paul Bratley.
2. Approximation Algorithms: Vijay V. Vazirani
3. Reference book: Algorithmic :The spirit of computing: D. Harel
4. Design and analysis of algorithms, S. Sridhar

Additional Materials

Lecture Notes

ASSESSMENT GUIDELINES

CIE-Theory (60 Marks) Certification course – 20 Marks Class Test - 30 Marks Assignments - 10 Marks Class regularity – 10 Marks	CIE-Practical (60 Marks) Practical Performance during Lab – 20 Marks Practical Exam / Viva - 20 Marks File submission - 20 Marks
ESE-Theory- 40 Marks	ESE-Practical-40 Marks
Total: 200 Marks	

Your final course mark will be calculated from the following:

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective

components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

Course schedule (subject to change)

(Mention quiz, assignment submission, breaksetcas well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Basic concept of algorithm, Overview of Divide and Conquer, Greedy Algorithms	1, 2	Chalk & Board, Discussion
	Weeks 2	Dynamic Programming, Basic search and traversal techniques for graphs	1, 2	Chalk & Board, Discussion
	Week 3	Backtracking, Branch and Bound	2	Chalk & Board, Discussion
	Week 4	Flow Networks, Ford-Fulkerson method.	2, 3	Chalk & Board, Discussion

	Week 5	Introduction to string – matching problem, Naïve string matching algorithm	1, 2	Chalk & Board, Discussion
	Week 6	Rabin Karp, Knuth Morris Pratt, Boyer-Moore matching algorithms and complexity analysis.	1, 2, 3	Chalk & Board, Discussion
	Week 7	P, NP and NP-Complete complexity classes, Proof of NP-Completeness.	2	Chalk & Board, Discussion
	Week 8	Approximation algorithm concepts and types with example	1, 2	Chalk & Board, Discussion
	Week 9	Classification of Parallel System, PRAM Model, parallel algorithm specifications and analysis	1, 2	Chalk & Board, Discussion
	Week 10	Parallel Searching and Parallel Sorting.	2, 3	Chalk & Board, Discussion
	Week 11	Numerical probabilistic algorithms	2, 3	Chalk & Board, Discussion
	Week 12	Las Vegas and Monte Carlo algorithms, Game-theoretic techniques.	2, 3	Chalk & Board, Discussion

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Pruthvi Patel

Course code: DS0202
Course name: Soft Computing

Pre-requisites:
Students must know the fundamentals of programming, basic mathematical concepts such as differentiation and derivatives.

Credit points: 4
Offered Semester: II

Course co-ordinator:

Full name: Pruthvi Patel
Department with sitting location: Computer Engineering Department (Fourth floor staffroom, Bhanwar building)
Telephone: +91 8866311132
Email: pruthvipatel.ce@indusuni.ac.in
Consultation times:
Monday and Tuesday: 3:30 to 5:00 PM

Course Lecturers:

Full name: Pruthvi Patel
Department with sitting location: Computer Engineering Department (Fourth floor staffroom, Bhanwar building)
Telephone: +91 8866311132
Email: pruthvipatel.ce@indusuni.ac.in
Consultation times:
Monday and Tuesday: 3:30 to 5:00 PM

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

1. Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.

2. Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies

Course Outcomes (CO)

After successful completion of the course, student will able:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
4. Apply genetic algorithms to combinatorial optimization problems.
5. Apply neural networks to pattern classification and regression problems.
6. Effectively use existing software tools to solve real problems using a soft computing approach.
7. Evaluate and compare solutions by various soft computing approaches for a given problem.

Course Outline

UNIT-I	**[12 hours]**
Introduction to Neural Network	
Biological Neuron, Fundamental concept of Artificial Neural Network & Biological Neural Network , Evolution of Neural Networks, Basic Models of Artificial Neural Networks ,Types of Learning, Important Terminologies of ANNs ,Idea of computational units & Activation Functions, McCulloch–Pitts unit and Thresholding logic, Linear separability, Hebb network	
Supervised Learning Networks	
Perceptron, Perceptron Learning Algorithm, Convergence theorem for Perceptron Learning Algorithm, Adaline ,Multiple Adaptive Linear Neurons , Multi-layered Networks, Generalized delta rule, Gradient Descent, Backpropagation Network, Radial basis function network, Adaptive Learning rate, Feedback Networks, Back-propagation through time, real-time recurrent learning.	
UNIT-II	**[12 hours]**
Unsupervised Learning Networks	

Competitive Learning, Fixed weight Competitive Nets, Kohonen Self-organizing Feature Maps, Extended Kohonen SOM.
Associative Memory Networks
Training Algorithms for Pattern Association, Auto associative Memory Network , Heteroassociative Memory Network , Bidirectional Associative Memory , Hopfield Networks , Iterative Autoassociative Memory Networks , Temporal Associative Memory Network
UNIT-III [12 hours]
Fuzzy Logic
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications & Defuzzification, Fuzzy Controller, Industrial applications.
UNIT-IV [12 hours]
Genetic Algorithm
Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Selection techniques, Crossover Techniques, ,Genetic operators, Mutation, Mutation techniques ,Problem Solving using GA, applications.

Method of delivery

Chalk and Board, PowerPoint presentation, Practical Demonstrations

Study time

3 hrs theory, 2 hrs practical

CO-PO Mapping (PO: Program Outcomes)

Program Outcomes:

1. An understanding of the theoretical foundations and the limits of computing.
2. An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
3. An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.
4. Understanding and ability to use advanced computing techniques and tools.
5. An ability to undertake original research at the cutting edge of computer science & its related areas.
6. An ability to function effectively individually or as a part of a team to accomplish a stated goal.
7. An understanding of professional and ethical responsibility.
8. An ability to communicate effectively with a wide range of audience.
9. An ability to learn independently and engage in lifelong learning.
10. An understanding of the impact of IT related solutions in an economic, social and environment context.

CO-PO MAPPING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10

CO1	1	1	3	-	-	-	-	-	-	-
CO2	2	2	3	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-
CO4	1	1	2	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-
CO6	**2**	**2**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**
CO7	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

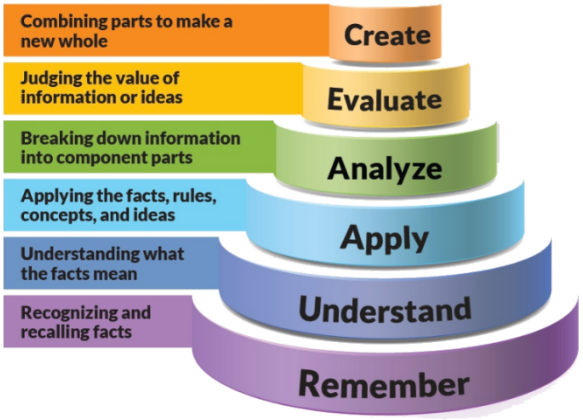

Figure 1: Blooms Taxonomy

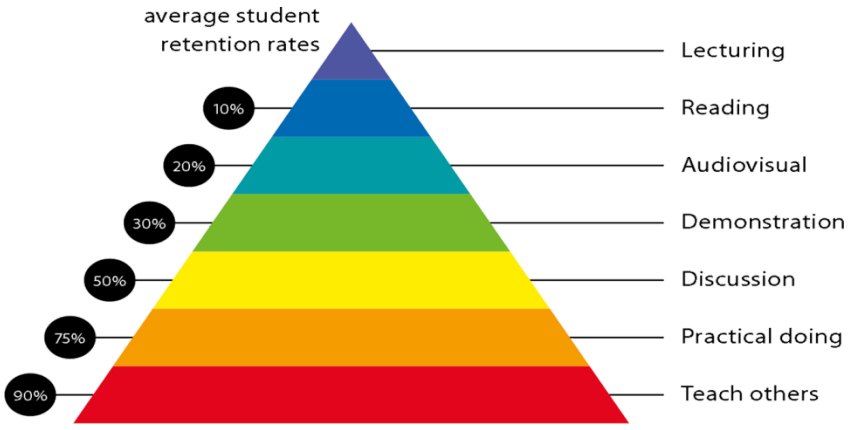

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an	**1 Professional knowledge, grounding & awareness**

area of study has developed and how it relates to other areas.	
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Wk No.	Class Activity	List of Practical
01	Lab 1	Introduction to MATAB Environment.
02	Lab 2	Write a Program to implement Hebb Algorithm.
03	Lab 3	Write a program of Perceptron Training Algorithm
04	Lab 4	Write a program to implement Adaline Algorithm.
05	Lab 5	Write a program to implement Madaline Algorithm
06	Lab 6	Write a program to implement Backpropogation Network (BPN) Algorithm.
07	Lab 7	Write a program to demonstrate Fuzzy Operations.
08	Lab 8	Write a program that demonstrates Fuzzy Relations (Max-Min Composition)
09	Lab 9	Write a program to demonstrate implementation of fuzzy controller (Washing Machine)
10	Lab 10	Write a program to implement Mc-Culloch pits Model using XOR
11	Lab 11	Implementation Genetic Application – Match Word Finding.
12	Lab 12	Study of various applications such as ● Multispectral Images with SAR Image for Flood Area Analysis,

		• Optimization of Travelling Salesman Problem using Genetic Algorithm Approach • Genetic Algorithm based Internet Search Technique • Soft Computing based Hybrid Fuzzy Controllers • Soft Computing based Rocket Engine Control

Lecture/tutorial times

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Text books

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007. ISBN: 10: 81-265-1075-7.
2. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.

Reference Books:

1. Siman Haykin,"Neural Netowrks" Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

Additional Materials

Web Resource

- https://www.youtube.com/watch?v=aYf3MKzExzI
- https://www.youtube.com/watch?v=0kgEjAAjxM8
- https://www.youtube.com/watch?v=HfdZE1dogfA
- https://www.youtube.com/watch?v=Z_8MpZeMdD4

ASSESSMENT GUIDELINES

CIE-Theory (60 Marks): **Class Test [30 Marks] (Date: 17/03/2019)** **Assignments [20 Marks]** **Presentation [10 Marks]**	**CIE-Practical (60 Marks):** **Lab manual + Regularity [20 Marks]** **Paper Writing [20 Marks]** **Internal Practical Exam [20 Marks]**
ESE-Theory- 40 Marks	**ESE-Practical- 40 Marks**
Total: 200 Marks	

Your final course mark will be calculated from the following:

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

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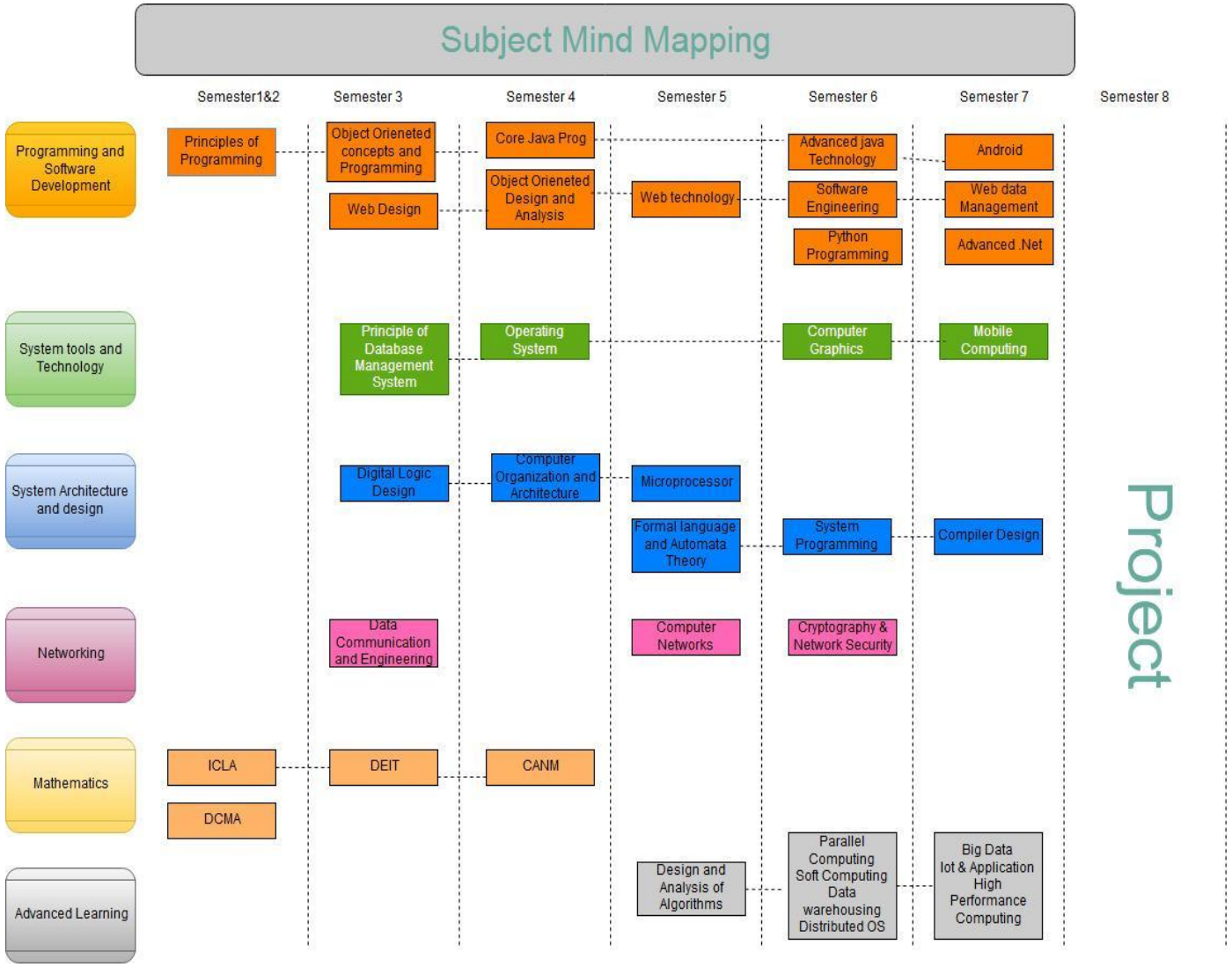
Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment.

Course schedule (subject to change)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Week 1	Biological Neuron, Fundamental concept of Artificial Neural Network & Biological Neural Network , Evolution of Neural Networks, Basic Models of Artificial Neural Networks, Types of Learning, Important Terminologies of ANNs	I	Chalk & Board, Discussion
	Week 2	Idea of computational units & Activation Functions, McCulloch–Pitts unit and Thresholding logic, Linear separability, Hebb network	II	Chalk & Board, Demonstration
	Week 3	Perceptron, Perceptron Learning Algorithm, Convergence theorem for Perceptron Learning Algorithm, Adaline , Multiple Adaptive Linear Neurons	II	Chalk & Board, Demonstration
	Week 4	Multi-layered Networks, Generalized delta rule, Gradient Descent, Backpropagation Network, Radial basis function network, 2	II	Chalk & Board, Demonstration
	Week 5	Adaptive Learning rate, Feedback Networks, Back-propagation through time, real-time recurrent learning.	II	Chalk & Board, Demonstration
	Week 6	Unsupervised Learning Networks Competitive Learning, Fixed weight Competitive Nets, Kohonen Self-organizing Feature Maps, Extended Kohonen SOM. 3	III	Chalk & Board (Class Test)
	Week 7	Associative Memory Networks Training Algorithms for Pattern Association, Auto associative Memory Network	III	Chalk & Board, Demonstration
	Week 8	Heteroassociative Memory Network , Bidirectional Associative Memory	I, IV	Chalk & Board, Demonstration (Presentation)
	Week 9	Hopfield Networks , Iterative Autoassociative Memory Networks , Temporal Associative Memory Network	I, IV	Chalk & Board Demonstration
	Week 10	Fuzzy Logic Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of	I, IV	Chalk & Board Demonstration

		fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.		
	Week 11	Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules	I, IV	Chalk & Board Demonstration (Quiz)
	Week 12	Fuzzy implications and Fuzzy algorithms, Fuzzifications & Defuzzification, Fuzzy Controller, Industrial applications. 2,5	VI	Chalk & Board Demonstration
	Week 13	Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection,	VI	Chalk & Board Demonstration
	Week 14	Selection techniques, Crossover Techniques, ,Genetic operators, Mutation, Mutation techniques ,Problem Solving using GA,	I, VI	Chalk & Board Demonstration
	Week 15	Applications	I, VI	Chalk & Board Demonstration


Subject Mind Mapping
Semester1&2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Semester 8
Programming and Software Development
System tools and Technology
System Architecture and design
Networking
Mathematics
Advanced Learning
Principles of Programming
Object Orieneted concepts and Programming
Web Design
Core Java Prog
Object Orieneted Design and Analysis
Web technology
Advanced java Technology
Software Engineering
Python Programming
Android
Web data Management
Advanced .Net
Principle of Database Management System
Operating System
Computer Graphics
Mobile Computing
Digital Logic Design
Computer Organization and Architecture
Microprocessor
Formal language and Automata Theory
System Programming
Compiler Design
Data Communication and Engineering
Computer Networks
Cryptography & Network Security
ICLA
DCMA
DEIT
CANM
Design and Analysis of Algorithms
Parallel Computing
Soft Computing
Data warehousing
Distributed OS
Big Data
Iot & Application
High Performance Computing
Project

Name of Institute: Institute of Engineering and Technology
Name of Faculty: Dr.Jay A. Dave

Course code: DS0203
Course name: Cloud Computing
Pre-requisites: NA
Credit points: 3
Offered Semester: 2nd

Course coordinator (weeks XX - XX)
Full name: Dr. Jay Dave
Department with siting location:3rd Floor Bhanvar Building
Telephone:-NA
Email:jaydave.ce@indusuni.ac.in
Consultation times: Monday to Friday **03:pm to 5:00pm**

Course lecturer (weeks xx - XX)
Full name:Prof.Dhaval Patel
Department with siting location: 4th Floor Bhanvar Building
Telephone:-
Email:bhavinfataniya.ce@indusuni.ac.in
Consultation times: Monday to Friday **03:pm to 5:00pm**

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

By participating in and understanding all facets of this course a student will:

1) **Identify the technical foundations of Cloud systems architecture.**
2) **Analyze the problems and solutions to cloud application problems.**
3) **Identify the research scope in cloud computing.**
4) **Describe various service delivery models of cloud computing architecture, and the ways in which clouds can be deployed as public, private, hybrid, and community clouds.**
5) **Comprehend the technical capabilities and business benefits of virtualization and cloud computing.**
6) **Describe the landscape of different types of virtualization and understand the different types of clouds.**

Course Outcomes (CO)

1) Explore the research scope of cloud computing.
2) Implement the virtual cloud.
3) Security perusal of data in cloud environment.
4) Compare various cloud service provider architecture.

Course Outline

UNIT-I
Introduction to Cloud Computing
Cloud Computing Overview, History of Cloud Computing, Layers and Types of Cloud, Offerings of a cloud, Software-as-a-Service, Platform-as-a-Service, Infrastructure-as-a-Service, Challenges and Risks.
Cloud Computing Architecture and Vitalization
Cloud Computing Architecture, Deployment Models, Virtualization, XML Basics, web Services, Service Oriented Architecture.
UNIT-II
Managing a Cloud and SLA
Managing cloud data, Introduction to MapReduce, OpenStack, Cloud Economics, Service Level Agreement (SLA), Resource Management, Case Studies Commercial Cloud and Google Cloud Platform.
Virtualization of the resource provisioning
Virtual machine technology, virtualization applications in enterprises, Drawbacks of virtualization.
Master of Technology, Board of Studies-2019 Department of Computer Engineering IITE, Indus University

Multitenancy on offering
Multi-entity support, Multi-schema approach, Multitenancy using cloud data stores, Data access control for enterprise applications.
UNIT-III
Cloud Security Aspects
Cloud security fundamentals
Vulnerability assessment tool for cloud, Privacy and Security in cloud
Cloud computing security Structure
Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security, Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques.
Cloud computing security Issues
Cloud Computing: Security Issues in Collaborative SaaS Clo, Cloud Computing: Broker for Cloud Marketplace
UNIT-IV
Recent trends and Research scope in cloud computing
Mobile cloud Computing, Fog Computing, Geo-Spatial cloud, Green Cloud Computing, IoT Cloud, Big Data and Cloud Computing, Introduction to Docket Container, Research Scope of the Cloud Computing, Open Source and Commercial Clouds, Cloud Simulator.

Method of delivery
Along with chalk and talk method for content delivery, Power point presentation and active learning pedagogy like role play, case study, reciprocal questioning and free write shall be leffectively used to enhance the class room participation.

Study time
Students must attend three lectures per week along with a couple of hours of practicals.

CO-PO Mapping (PO: Program Outcomes)
- **Engineering Graduates will be able to:**
- **PO1.** An understanding of the theoretical foundations and the limits of computing.
- **PO2.** An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently
- **PO3.** An ability to design, develop and evaluate new computer based systems for novel applicationswhich meet the desired needs of industry and society
- **PO4.** Understanding and ability to use advanced computing techniques and tools.
- **PO5.** An ability to undertake original research at the cutting edge of computer science & its related areas..
- **PO**6. An ability to function effectively individually or as a part of a team to accomplish a stated goal.
- **PO7.** An understanding of professional and ethical responsibility..
- **PO8.** An ability to communicate effectively with a wide range of audience.
- **PO9.** An ability to learn independently and engage in lifelong learning.
- **PO10** An understanding of the impact of IT related solutions in an economic, social and environment context

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO1		√	√		√					
CO2	√	√		√						
CO3				√		√			√	√
CO4	√	√	√						√	

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

Figure 1: Blooms Taxonomy

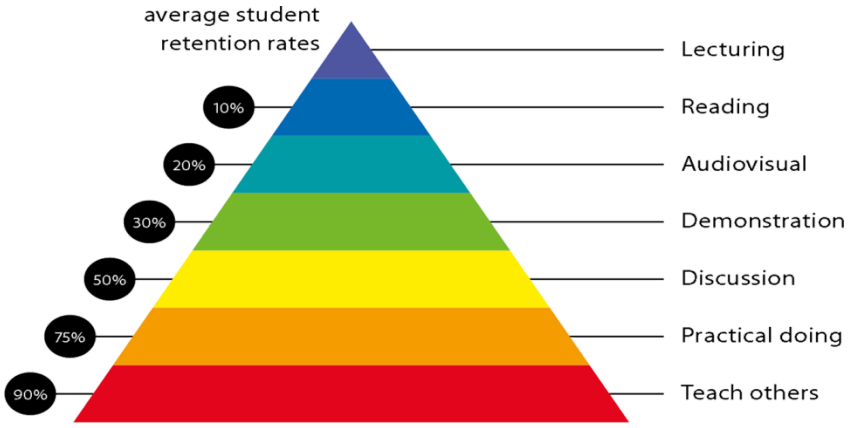


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities

Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, inquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem-solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

(Mention what practical work this Course involves)

The subject is offered with one practical credit which means couple of hours of practicals shall be undergone by the students where they need to explore various cloudsim pbased programs anc create simulation of cloud scenario.

Lecture/tutorial times

(Give lecture times in the format below)

Example:

Lecture	Tuesday	Bhanwar Building 4th floor Computer Lab
Lecture/Tutorial	Wednesday	
Practicals	Friday	

Attendance Requirements

The University norms state that it is the responsibility of students to attend all lectures, tutorials, seminars, and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of the referencing system to be used in written work

Text books

1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition

2. Gautam Shroff, Enterprise Cloud Computing: Technology, Architecture, Applications, Cambridge University Press, First EditionJudith Hurwitz, R Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies, Wiley India Edition, First Edition

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Theory	Practical
20 marks- Presentation **30 Marks- Class Test date18-03-2020** **10 Marks- Classroom participation and behaviour**	Practical performance + manual [20 Marks] Practical Minor project+Presentation [20 Marks] Practical Viva[20 marks]

Theory:

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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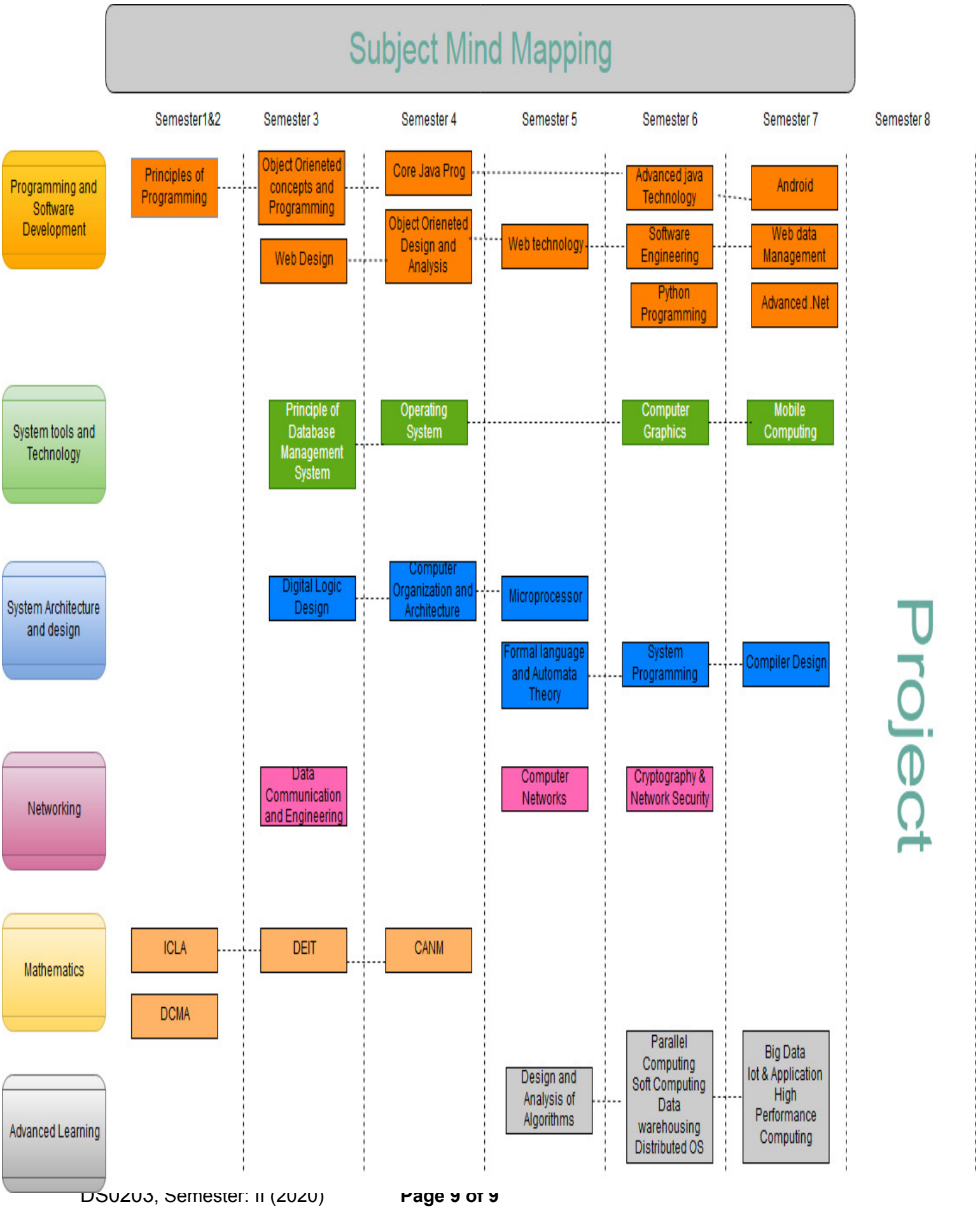
Course schedule(subject to change)

(Mention quiz, assignment submission, breaksetcas well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Cloud Computing Overview, History of Cloud Computing,	DS0203.1	Lectures,Assignments, Tutorials
	Weeks 2	Layers and Types of Cloud, **Cloud Security Aspects** **Cloud security fundamentals**	DS0203.3	Lectures,Assignments,Tutorials Case study
	Week 3	Offerings of a cloud, Software-as-a-Service	DS0203.1	Lectures,Assignments,Tutorials Case study
	Week 4	Platform-as-a-Service, Infrastructure-as-a-Service, Challenges and Risks	DS0203.1	Lectures,Assignments,Tutorials Case study
	Week 5	Cloud Computing Architecture, Deployment Models	DS0203.4	Lectures,Assignments,Tutorials Case study
	Week 6	Virtualization, XML Basics, **Recent trends and Research scope in cloud computing**	DS0203.1	Lectures,Assignments,Tutorials Case study
	Week 7	Services, Service Oriented Architecture.	DS0203.4	Lectures,Assignments,Tutorials Case study
	Week 8	Managing cloud data, Introduction to MapReduce	DS0203.1	Lectures,Assignments,Tutorials Case study
	Week 9	OpenStack, Cloud Economics, Service Level Agreement (SLA),	DS0203.4	Lectures,Assignments,Tutorials Case study
	Week 10	Resource Management, Case Studies Commercial Cloud and Google Cloud Platform.	DS0203.4	Lectures,Assignments,Tutorials Case study
	Week 11	Virtual machine technology, virtualization applications in enterprises	DS0203.2	Lectures,Assignments,Tutorials Case study
	Week 12	Multi-entity support, Multi-schema approach, Multitenancy using cloud data stores, Data access control for enterprise applications.	DS0203.1	Lectures,Assignments,Tutorials Case study


Subject Mind Mapping
Semester1&2
Semester 3
Semester 4
Semester 5
Semester 6
Semester 7
Semester 8
Programming and Software Development
Principles of Programming
Object Orieneted concepts and Programming
Web Design
Core Java Prog
Object Orieneted Design and Analysis
Web technology
Advanced java Technology
Software Engineering
Python Programming
Android
Web data Management
Advanced .Net
System tools and Technology
Principle of Database Management System
Operating System
Computer Graphics
Mobile Computing
System Architecture and design
Digital Logic Design
Computer Organization and Architecture
Microprocessor
Formal language and Automata Theory
System Programming
Compiler Design
Networking
Data Communication and Engineering
Computer Networks
Cryptography & Network Security
Mathematics
ICLA
DCMA
DEIT
CANM
Advanced Learning
Design and Analysis of Algorithms
Parallel Computing Soft Computing Data warehousing Distributed OS
Big Data Iot & Application High Performance Computing
Project

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Srishti Sharma

Course code: DS0206
Course name: Knowledge Discovery (Elective – III)
Pre-requisites:
1. Study of Database Management Systems
2. Knowledge of Statistics and Mathematics
3. Knowledge of Data Warehousing and Mining

Credit points: 4
Offered Semester: II

Course Coordinator (weeks 12)
Full Name: Srishti Sharma
Department with sitting location: 3rd Floor, Bhanwar Building
Telephone: 3329
Email: srishtisharma.ce@indusuni.ac.in
Consultation times: 3:45 PM to 4:20 PM

Course Lecturer (weeks 12)
Full Name: Srishti Sharma (CSE & IT)
Department with sitting location: 4th Floor, Bhanwar Building
Telephone: 3329
Email: srishtisharma.ce@indusuni.ac.in
Consultation times: 3:45 PM to 4:20 PM

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

1. To learn how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make Decisions.
2. To Develop and apply critical thinking, problem-solving, and decision-making skills. Define knowledge discovery and data mining.
3. Recognize the key areas and issues in data mining
4. Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data
5. Determine whether a real world problem has a data mining solution
6. Apply evaluation metrics to select data mining techniques.

Course Outcomes (CO)

1. To ***learn*** how to gather and analyze large sets of data to gain useful business understanding and how to produce a quantitative analysis report/memo with the necessary information to make Decisions.
2. To ***develop*** and apply critical thinking, problem-solving, and decision-making skills. Define knowledge discovery.
3. To ***recognize*** the key areas and issues in knowledge discovery
4. To ***apply*** the techniques of clustering, classification, association finding, feature selection, numeric predictions, artificial neural networks and visualization to real world data
5. To ***determine*** whether a real world problem has a solution using knowledge discovery techniques
6. To ***apply*** evaluation metrics to select techniques used for discovering knowledge from the huge data available

Course Outline

The outline of this course is to provide students with an in depth knowledge about Data Warehouses and the process of Mining Knowledge from these Data Warehouses. The curriculum includes details about various functionalities, tasks and applications of Data Mining such as Classification, Clustering, and Multidimensional Data Modeling, Numeric Predictions, Artificial Neural Networks.

Method of delivery

Face to face lectures, self-study material, Active Learning Techniques, PowerPoint Presentations, Assignments

Study time

Lecture hours: 3 hours
Lab hours: 2 hours

CO-PO Mapping (PO: Program Outcomes)

1. Program Outcomes (PO's)

The main outcomes of the CSE (M.Tech.) program are given here. At the end of the program a student is expected to have:

PO1 An understanding of the theoretical foundations and the limits of

computing. **PO2** An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
PO3 An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society. **PO4** Understanding and ability to use advanced computing techniques and tools.

PO5 An ability to undertake original research at the cutting edge of computer science & its related areas.
PO6 An ability to function effectively individually or as a part of a team to accomplish a stated goal.
PO7 An understanding of professional and ethical responsibility.
PO8 An ability to communicate effectively with a wide range of audience. **PO9** An ability to learn independently and engage in lifelong learning. **PO10** An understanding of the impact of IT related solutions in an economic, social and environment context

2. Program Specific Outcome (PSO's)

Computer Engineering:

1. To provide students with a strong foundation of Computer Basics in the students for them to address real time problems.
2. To enable the students to derive technical solutions to problems faced in industries and in research.
3. To impart good communication skills in the graduating students along with professional ethics.
4. To inculcate the attitude of continuous learning amongst the students for them to keep themselves updated as per the changing dynamics of Technology.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	-	-	-	2	-	-	2	-	-
CO2	-	3	-	-	-	-	-	-	2	-
CO3	-	-	-	-	-	-	-	-	2	2
CO4	-	3	-	3	-	-	-	-	-	-
CO5	-	2	3	-	3	-	3	-	2	3
CO6	-	2	2	2	-	-	-	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

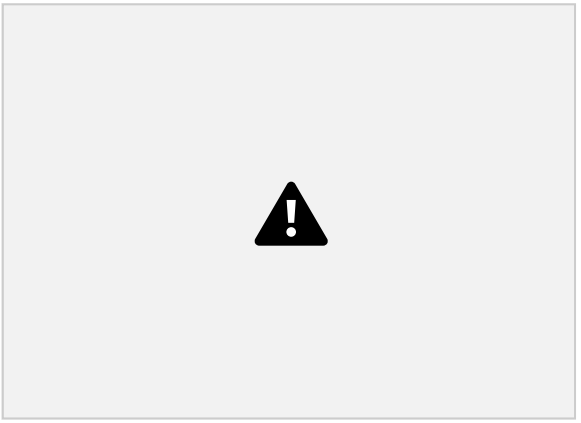


Figure 1: Blooms Taxonomy

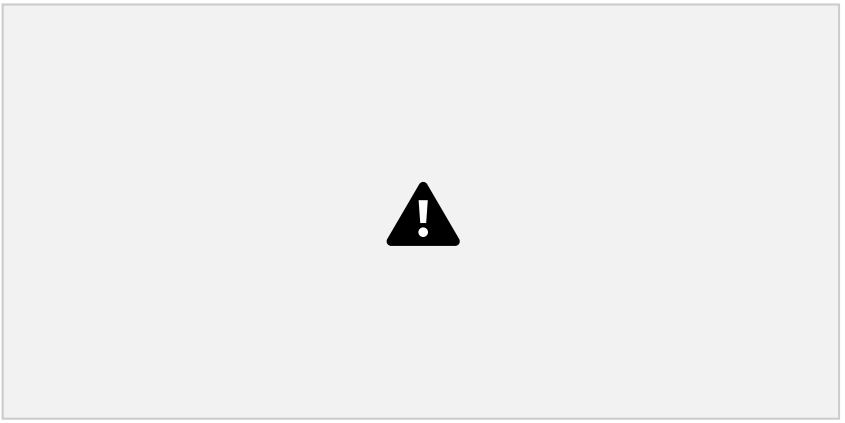


Figure 2: Knowledge retention

Post Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of	**2 Information literacy, gathering & processing**

sources and technologies. Acknowledge the work and ideas of others.	
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Week No.	Class Activity	Subject content to be delivered
01	Lab 1	Study of Weka Data Mining Tool
02	Lab 2	To perform Classification over sample dataset in Weka
03	Lab 3	To perform Clustering over sample dataset in Weka
04	Lab 4	To perform correlation and association finding over attributes of sample dataset in Weka
05	Lab 5	To perform Association Rule Mining using Apriori over sample dataset in Weka
06	Lab 6	Study of R Language and R Studio
07	Lab 7	To perform Dataset Analysis and Visualization in R Studio
08	Lab 8	To perform Classification and Clustering over Sample Dataset in

		RStudio
09	Lab 9	To perform Association Rule Mining over Sample Dataset in R Studio
10	Lab 10	To perform Linear Regression in RStudio
11	Lab 11	To perform Logistic Regression in RStudio
12	Lab 12	Study of Hadoop Distributed File System

Lecture/tutorial times

Example:
Class Activities
Presentation 10 Marks (Week 3)
Class Test 20 Marks (20/03/2020)
Case Study 30 Marks (Week 11)

Lab Activities
Data Visualization Activity 10 Marks (Week 2)
Minor Project Implementation 30 Marks (Week 10)
Lab Practicals and Manual Evaluation 10 Marks (Week 11)

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text books

1. Data Mining concepts and Techniques by Jiawei Han, Micheline Kamber –Elsevier.

Reference books

1. Data Mining by Arun K. Pujari – University Press.
2. Modern Data Warehousing, Data Mining and Visualization by George M. Marakas – Pearson.
3. Data Mining by Vikram Puri and P.RadhaKrishana –Oxfrod Press.

4. Data Warehousing by Reema Theraja –Oxford Press
5. Data mining and knowledge discovery handbook by Maimon, oded(et al.)
6. Data Cleansing : A Prelude to knowledge Discovery

Additional Materials

Sr. No.	Online Sources	Remarks
1	NPTEL- Lecture https://nptel.ac.in/courses/110106064/	Big Data Analytics
2	NPTEL- Lecture https://nptel.ac.in/courses/106101007/	Natural Language Processing

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Example:
Class Activities
Presentation 10 Marks (Week 3)
Class Test 20 Marks (20/03/2020)
Case Study 30 Marks (Week 11)

Lab Activities
Data Visualization Activity 10 Marks (Week 2)
Minor Project Implementation 30 Marks (Week 10)
Lab Practicals and Manual Evaluation 10 Marks (Week 11)

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work
Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format
All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work
Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies
Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

Course schedule (subject to change)
(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

Week #	Topic & contents
Weeks 1	Importance of Data Mining, Data Mining Architecture, Data Mining Functionalities, Classification of Data Mining Systems

		Teaching Learning Activity (TLA)
Weeks 2 Week 3 Week 4	Issues in Data Mining, Applicati Data Mining, Social Impacts of Mining, Multidimensional Data Data Warehouse Model and Architecture, Difference betwee Database and Data Warehouse, I Warehouse Implementation and Cube Technology Data Cleaning, Data Integration Reduction, Data Transformation	Assignment, Quiz Assignment Assignment
Week 5	Decision Trees – Divide and Co Entropy, Pruning	Assignment Assignment
Week 6	Association Rule Mining, Apri FP Growth Algorithms, Mining Dimensional Association Rules	Assignment, Quiz
Week 7 Week 8 Week 9	Multilevel and Multidime Association Rule Mining, Co based Rule Mining, Introduc Classification Classification by Bayesian Classification Numeric Prediction	Assignment, Quiz Assignment Assignment, Quiz Assignment, Quiz
Week 10	Introduction to Clustering, Clu using Partition based tech Clustering using Hiera techniques	Week 11 Density based Clustering, Grid based Clustering 1,2 Assignment, Quiz

Case Study

1,2

Week 12 Artificial Neural Networks

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Naiswita Parmar

Course code: DS0209
Course name: Web Analytics and Development (Department Elective-IV)
Pre-requisites: -
Students must have a working knowledge of fundamental of computer. For some of the practical aspects of the course, a working knowledge of computer is expected.

Credit points: 4
Offered Semester: II

Course coordinator
Full name: Naiswita Parmar
Department with siting location:
Telephone: +91 9704788141
Email: naiswitaparmar.ce@indusuni.ac.in
Consultation times:
Saturday 9:30 am to 4:00 pm

Course lecturer
Full name: Naiswita Parmar
Department with siting location:
Telephone: +91 9704788141
Email: naiswitaparmar.ce@indusuni.ac.in
Consultation times:
Saturday 9:30 am to 4:00 pm

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

1) The course explores use of social network analysis to understand growing connectivity and complexity in the world ranging from small groups to WWW.
2) Learn the information retrieval models.
3) Be familiar with Web Search Engine.
4) Be exposed to Link Analysis.
5) Understand Hadoop and Map Reduce.
6) Learn document text mining technique

Course Outcomes (CO)

By participating in and understanding all facets of this course a student will be able to:

i. To ***determine*** how to leverage data from various sources to conduct quantitative and qualitative research, and deliver actionable, data-informed business insights

ii. To have complete end-to-end ***understanding*** of how digital and data analytics impact the conversion funnel, customer retention and acquisition

iii. To ***apply*** the concepts of web analytics from ground zero to mastering the analytics domain across digital channels

iv. To ***develop*** in-depth knowledge of web analytics, social analytics, mobile analytics and content analytics.

Course Outline

UNIT-I	**[8 hours]**
Introduction	
Social network and Web data and methods, Graph and Matrices, Basic measures for individuals and networks, Information Visualization	
UNIT-II	**[8 hours]**
Web Analytics tools	
Click Stream Analysis, A/B testing, Online Surveys	
Web Search and Retrieval	
Search Engine Optimization, Web Crawling and indexing, Ranking Algorithms, Web traffic models	
UNIT-III	**[8 hours]**
Making Connection	
Link Analysis, Random Graphs and Network evolution, Social Connects: Affiliation and identity	
UNIT-IV	**[8 hours]**
Connection	
Connection Search, Collapse, Robustness Social involvements and diffusion of innovation	

Method of delivery

Chalk and Board, PowerPoint presentation, Model generation, demonstration of devices, cables

Study time

2 hrs theory, 2 Hrs practical

CO-PO Mapping (PO: Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	1	-	-	-	-	-	-	-	1	1
CO3	-	3	2	-	-	-	-	-	-	-	2	-
CO4	2	1	3	-	-	-	-	-	-	-	-	-

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

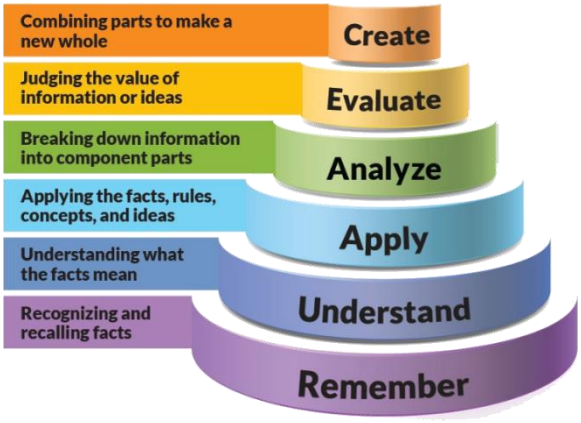


Figure 1: Blooms Taxonomy

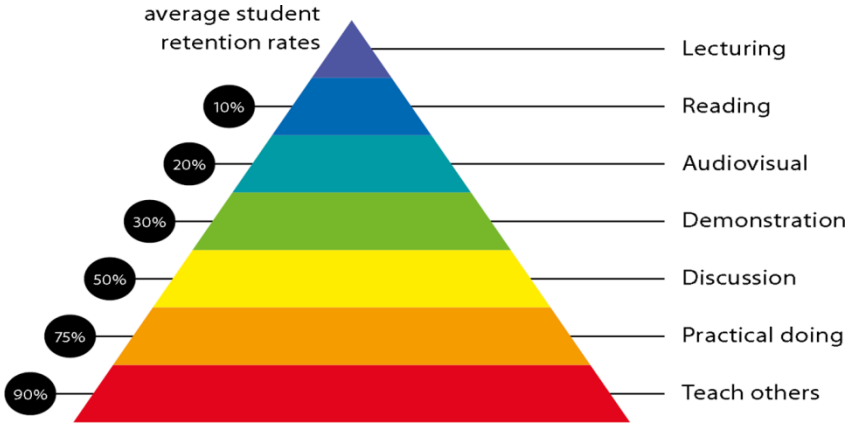


Figure 2: Knowledge retention

Post Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies.	**2 Information literacy, gathering & processing**

Acknowledge the work and ideas of others.	
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

1	Implement Search engine optimization on website using google analytics	Basic knowledge of SEO
2	Implement Search engine optimization on personal blogs using google analytics	Basic knowledge of SEO
3	Implement Search engine optimization on website using SEMRUSH.	Basic knowledge of SEMRUSH
4	Implement Search engine optimization on personal blogs using SEMRUSH.	Basic knowledge of SEMRUSH
5	Implement Search engine optimization on website using small SEO tools	Learn SEO tools
6	Implement Search engine optimization on personal blogs using small SEO tools	Learn SEO tools
7	Implement Search engine optimization on website using SEO analyzer	Learn SEO tools
8	Implement Search engine optimization on personal blogs using SEO analyzer.	Able to analyze real time data
9	Study about documents mining techniques.	Basic knowledge of document mining
10	Implements map reducing using hadoop	Learn map reduce programming

Lecture/tutorial times

(Give lecture times in the format below)

Lecture	Week day	00.00am/pm – 00.00 am/pm	Room No

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Text books

1. Hansen, Derek, Ben Sheiderman, Marc Smith. 2011. Analyzing Social Media Networks with NodeXL: Insights from a Connected World. Morgan Kaufmann, 304
2. Avinash Kaushik. 2009. Web Analytics 2.0: The Art of Online Accountability

Reference Books:

1. Easley, D. & Kleinberg, J. (2010). Networks, Crowds, and Markets: Reasoning About a Highly Connected World. New York: Cambridge University Press. http://www.cs.cornell.edu/home/kleinber/networks-book/

2. Wasserman, S. & Faust, K. (1994). Social network analysis: Methods and applications. New York: Cambridge University Press. Monge, P. R. & Contractor, N. S. (2003). Theories of communication networks. New York: Oxford University Press.

Additional Materials

Web Resource
https://www.javatpoint.com/how-search-engine-works
https://www.geeksforgeeks.org/google-search-works/
https://nlp.stanford.edu/IR-book/pdf/20crawl.pdf
https://moz.com/beginners-guide-to-seo/how-search-engines-operate /

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks) **Class Test – 20 Marks** **Case Study - 30 Marks** **Presentation – 10 Marks**	**CIE-Practical (60 Marks)** **Data Visualization Activity – 10 Marks** **Lab Practicals & Manual – 10 Marks** **Minor Project Implementation – 40 Marks**
ESE-Theory- 40 Marks	**ESE-Practical-40 Marks**
Total: 200 Marks	

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment.

Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Social network and Web data and management	**I**	Chalk & Board, Discussion
	Weeks 2	Graph and Matrices	**I**	Presentation, Chalk & Board
	Week 3	Basic measures for individuals and networks	**I**	Presentation, Chalk & Board
	Week 4	Information Visualization	**II**	Presentation, Chalk & Board
	Week 5	Web Analytics tools	**II**	Presentation, Chalk & Board
	Week 6	Click Stream Analysis, A/B testing, Online Surveys	**II**	**Model presentation**
	Week 7	Web Search and Retrieval, Search Engine Optimization	**II**	**Presentation, Chalk & Board, Demonstration**
	Week 8	Web Crawling and indexing	**II**	**Presentation, Chalk & Board, Demonstration**
	Week 9	Search Engine Optimization	**III**	**Presentation, Chalk & Board**
	Week 10	Ranking Algorithms, Web traffic models	**III**	**Presentation, Chalk & Board**
	Week 11	Link Analysis	**IV**	**Presentation, Chalk & Board**
	Week 12	Social Connects: Affiliation and identity	**IV**	**Presentation, Chalk & Board**
	Week 13	Connection Search, Collapse,	**IV**	**Presentation, Chalk & Board**

	Week 14	Robustness Social involvements and diffusion of innovation	**IV**	**Presentation, Chalk & Board**