Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech.
Class, Semester	First Year M. Tech.CSE Sem II
Course Code	6OE509
Course Name	Machine Learning in practice
Desired Requisites:	Basic mathematics and python programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce python and mathematical concepts required for machine learning
2	To prepare data for machine learning
3	To implement supervised and unsupervised learning algorithm

Course Outcomes (CO) with Bloom's Taxonomy Level

CO1	Apply different data pre-processing techniques required for data preparation.	Apply
CO2	Identify and implement different machine learning algorithms to solve real life problems.	Analyze
CO3	Evaluate and compare performance of the machine learning algorithms.	Evaluate

Module	**Module Contents**	**Hours**
I	**Introduction to Machine Learning** Introduction, Types of machine learning, Applications of Machine Learning, Python basics: basic constructs of python, pandas, NumPy, Matplotlib for data visualization	6
II	**Data pre-processing** Data Cleaning: handling missing values, removing noise from data, handling categorical features, Feature selection and reduction, Data normalization, Train/test split, cross-validation	6
III	**Supervised Learning-I** Linear regression, multiple regression, MSE, RMSE Classification using Naïve Bayes classifier, Decision tree classifier, KNN, logistic regression	8
IV	**Supervised Learning-II** Ensemble models: tree-based algorithms, Bagging, Boosting, Stacking **Model Performance** Confusion matrices, accuracy, precision, recall, F1 score, Hyperparameter tuning, deployment	8
V	**Unsupervised Learning** Clustering- K means clustering, HDBSCAN, Dimensionality reduction using PCA.	5
VI	**Reinforcement learning and Case study** Introduction to reinforcement learning, Types, elements and applications of Reinforcement learning, Case studies based on various applications of machine learning algorithms in real life.	6

Text Books

1	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2	Introduction to Machine Learning Edition 2, by Ethem Alpaydin.
3	

References	
1	
2	
3	

Useful Links	
1	NPTEL 'Introduction to Machine learning' -Link
2	

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	2	2				
CO2				3		
CO3	1		1			2

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High.
Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on 1 in-semester examinations in the form of ISE of 20 marks and MSE of 30 Marks. Also, there is End-Sem examination (ESE) of 50 marks. MSE shall be typically on modules 1 2 and 3, ISE based typically on all the modules and ESE shall be on all modules with nearly 30% weightage on first 3 modules and 70% weightage on modules 4, 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		ISE	MSE	ESE	Total
1	Remember				
2	Understand				
3	Apply		15	20	35
4	Analyse		15	20	35
5	Evaluate	20		10	30
6	Create				
Total		**20**	**30**	**50**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO575
Course Name	Data Encryption and compression Lab
Desired Requisites:	Encryption and decryption techniques.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	to introduce classical encryption techniques and concepts of modular arithmetic and number theory..
2	To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Apply different encryption techniques	Apply
CO2	Compare and evaluate different cryptographic algorithms	Evaluate
CO3		

Experiment Guidelines

Experiment list:

1. To implement Huffman coding.
2. To implement Arithmetic Coding.
3. To implement μ law encoding
4. To implement one dimension DCT
5. To implement two dimension DCT
6. To implement Chinese Remainder Theorem
7. To implement Ceaser Cipher Algorithm
8. To implement RSA Algorithm
9. To implement Diffie-Hellman Key exchange

Text Books

1	Data Compression . David Salomon , Springer Publication, 4th Edition.
2	Introduction to Data Compression, Khalid Sayood, Morgan Kaufmann Series, 3rd Edition
3	Cryptography and Network Security, William Stallings, Pearson Education Asia Publication, 5th Edition.
4	Cryptography and Network Security, Behrouz Forouzan, McGraw-Hill, 1st Edition.

References	
1	Cryptography and Network Security, Behrouz Forouzan, McGraw-Hill, 1st Edition.
2	The Data Compression Book, Mark Nelson, BPB publication, 2nd Edition
3	Applied Cryptography, Bruce Schnerer, John Willey & Sons Inc. Publication, 2nd Edition
Useful links	
1	NPTEL lectures

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO574
Course Name	Natural Language processing Lab
Desired Requisites:	NLP concepts

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To introduce the students with the basics of NLP.
2	empower students for developing advanced NLP tools and solving practical problems in the field
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	assistants that are used in various business fields/areas	Apply
CO2	Develop the knowledge of NLP	Create
CO3		

Experiment Guidelines

Experiment list:

1. Preprocessing of text (Tokenization, Filtration, Script Validation, Stop Word Removal, Stemming)
2. Morphological Analysis
3. N-gram model
4. POS tagging
5. Chunking
6. Named Entity Recognition
7. Virtual Lab on Word Generator
8. Mini Project based on NLP Application

Text Books

1	Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems by Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana (Published on June 17, 2020)
2	Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning by Delip Rao, Brian McMahan (Published on February 19, 2019)

References

1	Natural Language Processing in Action: Understanding, analyzing, and generating text with Python by Hobson Lane, Hannes Hapke, Cole Howard (Published on April 14, 2019)
2	
3	
Useful links	
1	http://nlp-iiith.vlabs.ac.in/

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO579
Course Name	ADVANCED DAATABASE SYSTEM LAB
Desired Requisites:	DATABASE MANAGEMENT SYSTEM

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To explore the features of a Database Management Systems
2	To interface a database with front end tools
3	To understand the internals of a database system

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Ability to use databases for building web applications.	Apply
CO2	Gaining knowledge about the internals of a database system.	Create
CO3		

Mini Project Guidelines

Course Contents:

1. Basic SQL
2. Intermediate SQL
3. Advanced SQL
4. ER Modeling
5. Database Design and Normalization
6. Accessing Databases from Programs using JDBC
7. Building Web Applications using PHP & MySQL
8. Indexing and Query Processing
9. Query Evaluation Plans
10. Concurrency and Transactions
11. Big Data Analytics using Hadoop

Text Books

1	1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011

2	

References	
1	1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007
2	
3	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO578
Course Name	Network Security Lab
Desired Requisites:	Basics of computer network

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	implies that unauthorized individuals mustn't have any sort of access to the info .
2	Integrity for data means changes made to data are done only by authorized individuals/systems.
3	**Availability:** this is applicable to systems and to data.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Understanding security architectures, protocols and services in both wired and wireless networks	UNDERSTAND
CO2	Understand the role of security protocols in securing networks	APPLY
CO3	Discover, analyze and identify security issues in the network.	APPLY
CO4	Evaluate the use of an IDS and IPS in a working environment	ANALYZE
CO5	Apply security mechanisms, security policies, security components (such as protection domains and firewalls), port security and protection to secure networks	CREATE

Mini Project Guidelines

Course Contents:

1. Make a Detailed Report on Network Security Threats covering Structured, Unstructured, Internal and External Threats

2. Perform the following Scan using Wireshark and analyze your results

(a)Analyze TCP session

(b) Perform and analyze these scans

(i) Start a Wireshark capture. Open a Windows-> command window and perform a Host Scan (using ICMP packets) on a neighbours machine using nmap –sP [neighbors ip address]. Stop the capture and filter the traffic for ARP and ICMP packets.(ii)Start a new Wireshark capture, and then perform a host scan (ICMP scan) on a system out with the subnet, such as nmap –sP scanme.nmap.org.(Stop the capture and filter the traffic for ARP and ICMP packets and Compare

with previous results.

(iii) Start a new Wireshark capture, and then perform a complete Port Scan (in this case a TCP SYN scan) and an Operating System Fingerprint on a neighbours machine using nmap –O [neighbours ip address] . The –O option should provide the OS running on the scanned machine.Stop the capture and filter for source address == your machines address if necessary.

3. To Analysis Network using Wireshark for

(a)Traffic Monitoring (TCP slow down and HTTP slow down)

(b) Packet Sniffing

4. Explore , execute and analysis traffic using TCP Dump and Net discover tools

Software

5. To explore Shodan for (a) locating Boats and Ship Locations (b) Searching and capturing Live Cameras. (b) To Write a small NSE Script

6. To spoof IP address of your own system using Kali Linux

7.To sniff traffic using ARP Spoofing

8. To perform man in middle attack using DNS spoofing

9.To perform UDP session hijacking using Scapy

10.To perform TCP session hijacking using Shijack.

11. Write and execute commands

• To view routing Table

• To view network statistics of a network

• To view all routes

• To update/modify/add/delete routes in a routing table

12. To Perform HTTP Session Hijacking through Cookie stealing

13. Configuring IPSec VPN Tunnel Mode using Packet Tracer

14.Decryption SSl/TLS Traffic using Wireshark

15. To Configure AAA (TACACS+) on Packet Tracer for User Authentication

16. User account Using TACACS AND RADIUS ON PACKET TRACER

17. Configure Numbered ACL for a given topology.

18. Perform Wireless Hacking using aerodumpng

Text Books	
1	B William Stallings, " Network Security Essentials (Applications and Standards)", Pearson Education., 5th Edition,2011
2	Ryan Russell, " Hack Proofing your network ", Wiley,2nd Edition,2002
References	
1	Karen Scarf one, “Guide to Intrusion and prevention System”, NIST Special Publication, 2nd Edition,2007
2	
Usefull Links	
1	https://nptel.ac.in/syllabus/syllabus.php?subjectId=106105031
2	https://www.cybrary.it/course/security-for-beginners/
3	https://www.udemy.com/topic/Network-Security/
4	https://www.coursera.org/courses?query=network%20security
5	https://www.edx.org/learn/network-security

CO-PO Mapping

	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
CO3	1			2		
CO4		2			1	
CO5			2	1		2

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30

ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO577
Course Name	Machine Learning Lab
Desired Requisites:	Data Science

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To formulate machine learning problems corresponding to different applications.
2	To illustrate a range of machine learning algorithms along with their strengths and weaknesses.
3	To apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Implement a range of machine learning algorithms along with their strengths and weaknesses.	Apply
CO2	Apply machine learning algorithms to solve typical problems in Machine Learning.	Apply
CO3	Analyze various machine learning tools	Analyze

Mini Project Guidelines

Course Contents:

Implement the following using Machine Learning

1. Implement linear regression using python.
2. Implement Naïve Bayes theorem to classify the English text.
3. Implementation of feature selection and extraction algorithm.
4. Implementation of logistic regression.
5. Implementation of KNN algorithm.
6. Implementation of decision tree.
7. Implementation of Naïve Bayesian classifier.
8. Implementation of Bayesian network.
9. Clustering Based on EM algorithm.
10. Clustering Based on k-Means algorithm.
11. Implementation of evaluation techniques.
12. Implementation of back propagation for ANN.

Text Books

1	T. Hastie, R. Tibshirani, J. Friedman,"The Elements of Statistical Learning", 2e, 2008
2	2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer 2016

References	
1	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani , “Introduction to Statistical Learning”, Springer, 2013
2	Richard Duda, Peter Hart, David Stork, “Pattern Classification”, John Wiley & Sons, 2e,2001
3	NPTEL online course by Prof. Balaraman Ravindran on “Introduction to Machine Learning”

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2		2	1		
CO2		1	1	2		
CO3			2	3	2	2
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom’s Taxonomy Level (Marks)				
Bloom’s Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M.Tech., Sem II
Course Code	6CO536
Course Name	Advanced Database System
Desired Requisites:	Database System

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To provide students with basic concepts in databases both in terms of usage and implementation
2	To make the students understand all requirement and operations that the analyst needed to analyze, design, and implement the systems
3	To identify various sources of information for literature review and data collection.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Aware of various database systems and its design issues	Understand
CO2	Design and implement a database for any specified domain according to well-known design principles that balance data retrieval performance with data consistency guarantees	Apply
CO3	Formulate data retrieval queries in SQL and the abstract query languages	Create

Module	**Module Contents**	**Hours**
I	Formal review of relational database and FDs Implication, Closure, its correctness	6
II	3NF and BCNF, Decomposition and synthesis approaches, Review of SQL99, Basics of query processing, external sorting, file scans	6
III	Processing of joins, materialized vs. pipelined processing, query transformation rules, DB transactions, ACID properties, interleaved executions, schedules, serialisability	7
IV	Correctness of interleaved execution, Locking and management of locks, 2PL, deadlocks, multiple level granularity, CC on B+ trees, Optimistic CC	7
V	T/O based techniques, Multiversion approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases	6

VI	Advanced topics: Database Security, Distributed databases design, Object Oriented database design & its implementation, Introduction to recent advances in database technology.	7

Text Books	
1	R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004
2	A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008
References	
1	
2	
Useful Links	
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		1												
CO2					2	2									
CO3				2											

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	ISE	MSE	ESE	Total
Remember				
Understand				
Apply	15			**15**
Analyze	15	10		**25**
Evaluate		10	20	**30**
Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M.Tech., Sem II
Course Code	6CO535
Course Name	Network Security
Desired Requisites:	Computer Network

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	Understand security architecture.
2	Acquire fundamental knowledge on the concepts of networking and security.
3	To elaborate the design and configuration of various network security protocols.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Apply the number theory concepts to different techniques to solve problems related to network .	Apply
CO2	Analyze security of network protocols and systems	Analyze
CO3	Identify and classify security threats and develop a security model to prevent, detect and recover from attack	Create

Module	**Module Contents**	**Hours**
I	**Introduction to network security** Need for Security, Security Attacks, Services and Mechanisms, Network Security, Model	7
II	**Symmetric Ciphers** Substitution &Transposition Techniques, Block Cipher, DES, Triple DES, Stream Ciphers, RC4	6
III	**Public Key Cryptography** Need and Principles of Public Key Cryptosystems, RSA Algorithm, Key Distribution and Management, Diffie-Hellman Key Exchange, Digital Signatures	7
IV	**Authentication** Authentication Requirements, Message Authentication Codes, Hashes, MD5 & SHA, User Authentication: Password, Certificate based & Biometric Authentication, Kerberos	6
V	**Network Security** Firewalls, IP Security, VPN, Intrusion Detection, Web Security, SSL, TLS	7

VI	**Wireless network security** Connecting to WEP/WPA PSK secured networks, monitoring and diverting wireless traffic Expected outcome: knowledge of a security level attainable by wireless networks	6

Text Books	
1	
2	

References	
1	
2	

Useful Links	
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3											2	2	
CO2	3	3											3	2	
CO3	3	2											3	1	

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember	5		5	**10**
Understand	5	5	5	**15**
Apply	5	5	10	**20**
Analyze	5		10	**15**
Evaluate		10	5	**15**
Create		10	15	**25**
Total Marks	**20**	**30**	**50**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO534
Course Name	Machine Learning
Desired Requisites:	Data Science

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To formulate machine learning problems corresponding to different applications.
2	To illustrate a range of machine learning algorithms along with their strengths and weaknesses.
3	To apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	implement a range of machine learning algorithms along with their strengths and weaknesses.	Apply
CO2	apply machine learning algorithms to solve typical problems in Machine Learning.	Apply
CO3	analyze various machine learning tools	Analyze

Module	**Module Contents**	**Hours**
I	Statistical Decision Theory - Regression, Classification, Bias Variance, Linear Regression, Multivariate Regression	4
II	Linear Classification, Logistic Regression, Support Vector Machines	4
III	Neural Networks - Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation Decision Trees, Regression Trees	5
IV	Bootstrapping & Cross Validation, Class Evaluation Measures, Confusion Matrix, F1 score, ROC curve	4
V	Clustering, KMeans, HDBSCAN, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering	6
VI	Hyper-parameter tuning, Deployment of Machine Learning models, introduction to deep learning	3

Text Books

1	Jason Bell, “Machine Learning Hands-On for Developers and Technical Professionals” Wiley 2015
2	Tom M. Mitchell “Machine Learning” MGH
3	Stephen Marsland, Taylor & Francis “Machine Learning: An Algorithmic Perspective” (CRC)
4	Trevor Hastie, Robert Tibshirani, Jerome H. Friedman “The Elements of Statistical Learning”.
References	
1	William Whsieh “Machine Learning Methods in the Environmental Sciences, Neural Networks” Cambridge Univ Press.
2	Richard O Duda, Peter E. Hart and David G. Stork, John “Pattern classification” Wiley &Sons Inc., 2001
3	Chris Bishop “Neural Networks for Pattern Recognition” Oxford University Press, 1995
Useful Links	
1	NPTEL Videos of ‘Introduction to Machine Learning’ Course: Link

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2	1											
CO2		1	1	2											
CO3			2	3	2	2									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom’s Taxonomy Level (Marks) (For lab Courses)

Bloom’s Taxonomy Level	ISE	MSE	ESE	Total
Remember				
Understand				
Apply	20	10	30	**60**
Analyze		10	30	**40**
Evaluate				
Create				
Total Marks	**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO533
Course Name	Theory and Applications of Remote Sensing & GIS
Desired Requisites:	Fundamentals of Image processing

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To impart knowledge of the fundamentals of Remote Sensing (RS) and geographical information systems (GIS)
2	To make students familiar with Data and Data Products in RS and GIS.
3	To acquaint students advantages and applications of RS and GIS

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Understand and summarize fundamental concepts in RS and GIS	Understand
CO2	Interpret and Apply various satellite RS data and demonstrate GIS data and GIS database management system	Apply
CO3	Compare and examine data and data Products of RS and GIS	Analyse
CO4	Select and Verify RS and GIS data and data products to design solution for various interdisciplinary problems	Evaluate

Module	**Module Contents**	**Hours**
I	**Concepts and Foundation of Remote Sensing** Introduction, Remote Sensing System, Electromagnetic Energy, Electromagnetic Spectrum and its Characteristics, Energy Interaction in the Atmosphere and with the Earth's Surface, Resolution in Remote Sensing, Broad Classifications of Sensors and Platform, Earth Observation Satellite and Sensors, Data Reception, Transmission and Processing, Remote Sensing Data and Data Products.	4
II	**Satellite Image Interpretation and Processing** Interpretation Procedure and Elements, Interpretation strategies and keys, Digital Image processing and Image Analysis steps, Image Rectification and Restoration, Image Enhancement, Spatial Filtering, Image Transformation, Image Classification and Analysis.	5
III	**Applications of Remote Sensing** Land use Land Cover Mapping, Crop Inventory, Ground Water Mapping, Urban Growth, Flood Plain Mapping, Disaster Management.	5

IV	**GIS – An Overview** Introduction, Geographical concepts and Terminology, Difference between Image Processing system and GIS, Various GIS packages and their salient features, Essentials components of GIS, Utility of GIS, GPS	4
V	**GIS Data** GIS Data types and Data Representation, Data Acquisition, Georeferencing of GIS Data, Raster and Vector data, Raster to Vector conversion, Remote Sensing Data in GIS, GIS Database and Database Management System	5
VI	**GIS Spatial Data Analysis and Applications** Measurements in GIS-Lengths, Perimeters, and Areas, Queries, Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation, Analysis of Surfaces, Network Analysis, GIS Applications	4

Text Books	
1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008
2	Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012

References	
1	Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012
2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010

Useful Links	
1	NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1			2												
CO2			2												
CO3	2			2											
CO4	3			2		2									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand	10	5	15	**30**
Apply	5	5	20	**30**
Analyze	5	5	15	**25**
Evaluate		5	10	**15**
Create				
Total Marks	**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M.Tech., Sem II
Course Code	6CO532
Course Name	Data Encryption and Compression
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To develop a research orientation among the students and to acquaint them with fundamentals of research methods.
2	To develop understanding of the basic framework of research process and techniques
3	To identify various sources of information for literature review and data collection.
4	To develop an understanding of the ethical dimensions of conducting applied research.
5	To develop understanding about patent process.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	**Classify** various methods to solve research problem.	Apply
CO2	**Construct** a research problem in respective engineering domain.	Apply
CO3	**Investigate** various data analysis techniques for a research problem.	Analyze
CO4	**Identify** various Intellectual Property Rights procedures	Apply

Module	**Module Contents**	**Hours**
I	Introduction to Data Compression Data Compression : Modelling and Coding, Statstical Modelling, Dictionary Schemes, LZ, Lossy CompressionShannon – Fano Algorithm, Huffman Algorithm, Adaptive Huffman CodingDifficulties in Huffman Coding, Arithmetic Coding – Decoding, Dictionary Based Compression	4
II	Video and Audio Compression Analog Video, Digital Video, MPEG – 2, H – 261 Encoder and Decoder Sound, Digital Audio, g-Law and A-Law Companding, MPEG – 1 Audio Layer	5
III	Data Security Security Goals, Cryptographic Attacks, Techniques, Symmetric Key: Substitution Cipher, Transposition Cipher , Stream and Block Cipher, DES, AES	5
IV	Network Security Email, PGP, S/MIME, Intrusion Detection System	4

	Web Security Considerations, SSL Architecture, SSL Message Formats, TLS, Secure Electronic Transactions Kerberos, X.509 Authentication Service, Public Key Infrastructure	
V	**Compression Techniques** Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Loss-less compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, com-posite source model, Coding: uniquely decodable codes, Prefix codes.	5
VI	**The Huffman coding algorithm** Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.	4

Text Books	
1	
2	

References	
1	
2	

Useful Links	
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		1												
CO2					2	2									
CO3				2											
CO4		2													

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand				
Apply	15			**15**
Analyze	15	10		**25**
Evaluate		10	20	**30**

Create		10	20	**30**
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO531
Course Name	Natural Language Processing
Desired Requisites:	Mathematics – Linear Algebra, Probability Theory

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To build AI applications such that it will enable computer to read text, hear speech and interpret it.
2	To acquaint students with the basics of text processing
3	To illustrate steps involved in building text mining applications
4	To share the importance of different set of features for machine learning tasks

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	explain fundamental concepts of text processing	Understand
CO2	apply text processing algorithms to derive different representations of text	Apply
CO3	automate the real-life problems by choosing appropriate features and models	Evaluate
CO4	develop models for Information Retrieval and Chatbot application	Creating

Module	**Module Contents**	**Hours**
I	**Introduction** Introduction, Steps Involved, Tokenization, Stemming, Lemmatization, Regular expressions- extraction of information using Regex, Text Normalization, Minimum edit distance, Document Similarity measures - Cosine and cluster measures, exploration of python libraries like NLTK, SciPy, re.	4
II	**Language Models** Information Retrieval & Language Models Introduction, IDF, Tf-Idf, Boolean Model, Vector Space Model, N-gram Language Models, Spelling correction - Edit distance, Advanced smoothing for language modelling, POS tagging, Performance Measures, Precision, Recall, F-measure	5
III	**Distributed Word Representation** Vector Space Model - word vectors, GloVe/Word2Vec model, word embedding, Contextual Embeddings, Deriving Word Vectors from Corpus, Word Senses and WordNet	4

IV	**Text Classification** Constituency Grammars, Context-Free Grammar, Constituency Parsing, Dependency Parsing, Lexicons for Sentiment, Distributional Semantics, Topic Models, Sentiment Classification	4
V	**Sequence Classification** Sequence Labelling for Parts of Speech and Named Entities, Deep Learning Architectures for Sequence Processing, Models for Sequential tagging – MaxEnt, CRF, Recurrent Neural network relevant to NLP	5
VI	**Case Study** Machine Translation and Encoder-Decoder Models, Discourse Coherence, Question Answering, Chatbots & Dialogue Systems, Sentiment Analysis and Opinion Mining, Text Generation using Language Models	4

Text Books	
1	Steven Bird, Ewan Klein, and Edward Loper, "*Natural Language Processing with Python*", O'reilly Publications, 2009.
2	Yoav Goldberg**, "***Neural Network Methods for Natural Language Processing",* Synthesis Lectures on Human Language Technologies, 2017
References	
1	Dan Jurafsky and James H. Martin, "*Speech and Language Processing*", Standford University, 3rd Edition, 2020
2	Jason Brownlee, "*Deep Learning for Natural Language Processing*", 2017.
Useful Links	
1	NLP Course on NPTEL: Link

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1														
CO2	2		3												
CO3			2	1											
CO4		1			1	2									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand	5	5	10	**20**
Apply	5	5	20	**30**
Analyze	5	5	10	**20**
Evaluate	5	5	10	**20**
Create			10	**10**
Total Marks	**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO572
Course Name	Soft Computing Lab
Desired Requisites:	Programming knowledge

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week	Nil			
Interaction	-	**Credits: 1**			

Course Objectives

1	To demonstrate knowledge of implementation of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms and hybrid systems
2	To evaluate soft computing based solutions of real-world problems

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Apply appropriate soft computing technique for creating prototyping applications	Apply
CO2	Evaluate soft computing techniques in building intelligent machines	Evaluate

Module Contents

Course Contents:

Assignments

1.

Text Books

1	Rajasekaran S., Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press e-book

References

1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI, 1995

Useful Links

1	NPTEL LECTURES

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23						
Course Information						
Programme		M.Tech. (Computer science and engineering)				
Class, Semester		First Year M. Tech., Sem II				
Course Code		6CO592				
Course Name		Soft Computing Lab				
Desired Requisites:		Programming knowledge				
Teaching Scheme		**Examination Scheme (Marks)**				
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**	
Tutorial	-	30	30	40	100	
Practical	2 Hrs/week	Nil				
Interaction	-	**Credits: 1**				

Course Objectives	
1	To demonstrate knowledge of implementation of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms and hybrid systems
2	To evaluate soft computing based solutions of real-world problems

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	apply appropriate soft computing technique for creating prototyping applications	Apply
CO2	evaluate soft computing techniques in building intelligent machines	Evaluate

Sr. No.	**Module Contents**	**Hours**

Text Books	
1	Rajasekaran S., Vijayalakshmi Pai G.A., “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press e-book
References	
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2003
2	George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic: Theory and Applications”, PHI, 1995
Useful Links	
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1			2									
CO2			1		1										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom’s Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	LA1	LA2	ESE	Total
Remember				
Understand				
Apply	20	10	20	50
Analyze				
Evaluate	10	20	20	50
Create				
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO572
Course Name	Soft Computing Lab
Desired Requisites:	Programming knowledge

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week	Nil			
Interaction	-	**Credits: 1**			

Course Objectives

1	To demonstrate knowledge of implementation of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms and hybrid systems
2	To evaluate soft computing based solutions of real-world problems

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Apply appropriate soft computing technique for creating prototyping applications	Apply
CO2	Evaluate soft computing techniques in building intelligent machines	Evaluate

Module Contents

Course Contents:

Assignments

1.

Text Books

1	Rajasekaran S., Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press e-book

References

1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI, 1995

Useful Links

1	NPTEL LECTURES

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23						
Course Information						
Programme		M.Tech. (Computer science and engineering)				
Class, Semester		First Year M. Tech., Sem II				
Course Code		6CO592				
Course Name		Soft Computing Lab				
Desired Requisites:		Programming knowledge				
Teaching Scheme		**Examination Scheme (Marks)**				
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**	
Tutorial	-	30	30	40	100	
Practical	2 Hrs/week	Nil				
Interaction	-	**Credits: 1**				

Course Objectives	
1	To demonstrate knowledge of implementation of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms and hybrid systems
2	To evaluate soft computing based solutions of real-world problems

Course Outcomes (CO) with Bloom's Taxonomy Level		
At the end of the course, the students will be able to,		
CO1	apply appropriate soft computing technique for creating prototyping applications	Apply
CO2	evaluate soft computing techniques in building intelligent machines	Evaluate

Sr. No.	**Module Contents**	**Hours**

Text Books	
1	Rajasekaran S., Vijayalakshmi Pai G.A., “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press e-book
References	
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2003
2	George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic: Theory and Applications”, PHI, 1995
Useful Links	
1	NPTEL Lectures

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1			2									
CO2			1		1										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom’s Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	ISE	MSE	ESE	Total
Remember				
Understand				
Apply	20	10	20	50
Analyze				
Evaluate	10	20	20	50
Create				
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M.Tech., Sem II
Course Code	6CO571
Course Name	Advanced computer Lab
Desired Requisites:	Design and Analysis of Algorithms Basics, Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To introduce students to the advanced methods of designing and analysing algorithms.
2	To allow students choose appropriate algorithm and use it for a specific problem.
3	To impart knowledge of different classes of problems along with recent developments in the area of algorithmic design.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	apply and analyse algorithms involving different strategies for problem solving	Analyse
CO2	evaluate the complexity of the algorithm	Evaluate
CO3	develop the solution for open-ended problems and document it	Create

Sr. No.	**Assignments**	**Hours**
1	Implement various algorithms.	2
2	Implement BFS algorithm.	2
3	Implement DFS algorithm.	2
4	Implement Dijkstra algorithm.	2
5	Implement kruskal's algorithm.	2
6	Implement Floyd-Warshall algorithm.	2
7	Implement matrix multiplication.	2
8	Implement CRT.	2

9	Implement RSA algorithm.	2
10	Implement Fourier transform algorithm.	2
11	Implement P-NP, NP-Hard.	2

Text Books	
1	Cormen Thomas H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, *Introduction to Algorithms* PHI, Third Edition, 2009
2	Aho, Hopcroft, Ullman, *The Design and Analysis of Computer Algorithms*, Addison-Wesley Pub. Co., 1974.

References	
1	Kleinberg and Tardos, *Algorithm Design*, Pearson Education Limited
2	Robert Sedgewick, "*Algorithms in C++*", Addison-Wesley Professional, Third Edition

Useful Links	
1	NPTEL Videos of '*Data Structures and Algorithms*' Course: Link

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1			2												
CO2	3					2									
CO3		2		2	1										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	**Based on**	**Conducted by**	**Typical Schedule (for 26-week Sem)**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)				
Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO522
Course Name	Soft Computing
Desired Requisites:	Basic knowledge of mathematics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To foster student's abilities to implement soft computing-based solutions for real-world problems
2	To impart knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms
3	To discuss hybrid applications of ANN, Fuzzy and GA

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	analyze soft computing techniques and their roles in building intelligent machines	Analyze
CO2	evaluate fuzzy logic and neural networks techniques to solve various engineering problems	Evaluate
CO3	build prototyping applications using genetic algorithms and hybrid approaches	Create

Module	**Module Contents**	**Hours**
I	**Introduction:** Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation	6
II	**Fuzzy Logic:** Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making	7
III	**Neural Networks:** Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks	7
IV	**Genetic Algorithms:** Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition	7

V	**Hybrid Systems:** Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System(ANFIS)	6
VI	**Deep Learning:** Spark auto encoder, Convolutional neural networks, Recurrent neural networks, Deep belief networks	7

Text Books	
1	Rajasekaran S., Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003
2	Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press e- book

References	
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2003
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI, 1995

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2			3											
CO2			2	2		2									
CO3	2		2	2		2									
CO4															

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand				
Apply				
Analyze	20	10	20	**50**
Evaluate		10	20	**30**
Create			20	**20**
Remember				
Total	**20**	**20**	**60**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M. Tech. (Computer Science and Engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO521
Course Name	Advanced Computer Algorithms
Desired Requisites:	Design and Analysis of Algorithms Basics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-	Nil			
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce students to the advanced methods of designing and analysing algorithms.
2	To allow students choose appropriate algorithm and use it for a specific problem.
3	To impart knowledge of different classes of problems along with recent developments in the area of algorithmic design.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	apply algorithms involving different strategies for problem solving	Apply
CO2	analyze algorithm for given problem at hand	Analyze
CO3	evaluate the complexity of the algorithm	Evaluate

Module	**Module Contents**	**Hours**
I	**Elementary Algorithms** **Sorting:** Review of various sorting algorithms **Graph:** Topological sorting, Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.	8
II	**Graph Algorithms** **Matroids:** Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to Minimum Spanning Tree. **Shortest Path in Graphs:** Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.	6
III	**Parallel Algorithms** Introduction, Data and Temporal parallelism, RAM and PRAM Model, Shared Memory and Message Passing Models, PRAM Algorithms: Prefix Sum, List Ranking, Merging two sorted lists, Matrix multiplication, Analysis of PRAM Algorithms.	7

IV	**Modulo Representation and DFT** **Modulo Representation of integers/polynomials**: Chinese Remainder Theorem, Conversion between base-representation and modulo- representation, Powers of an element, The RSA public-key cryptosystem. **Discrete Fourier Transform (DFT):** In complex field, DFT in modulo ring. Fast Fourier Transform algorithm.	7
V	**NP-completeness:** Basic concepts of complexity classes- P, NP, NP-Hard, NP Complete, Examples, Proof of NP-hardness and NP-completeness. **One or more of the following topics based on interest-** Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm	6
VI	**Recent Trends** Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.	5

Text Books	
1	C. R. Kothari, Research Methodology, New Age international
2	Deepak Chopra and Neena Sondhi, Research Methodology : Concepts and cases, Vikas Publishing House, New Delhi

References	
1	Kleinberg and Tardos, *Algorithm Design*, Pearson Education Limited
2	Robert Sedgewick, "*Algorithms in C++*", Addison-Wesley Professional, Third Edition

Useful Links	
1	NPTEL Videos of '*Data Structures and Algorithms*' Course: Link

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1				2											
CO2	2			3											
CO3	1		1			2									

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	**ISE**	**MSE**	**ESE**	**Total**
Remember				
Understand	5	5	10	**20**
Apply	5	10	20	**35**
Analyze	5	10	10	**25**
Evaluate	5	5	10	**20**
Create				
Total Marks	**20**	**30**	**50**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO576
Course Name	Theory and Applications of Remote Sensing & GIS Lab
Desired Requisites:	Fundamentals of Image processing, Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week	Nil			
Interaction	-	**Credits: 1**			

Course Objectives

1	To inculcate and demonstrate knowledge of Remote Sensing (RS) and Geographic Information System (GIS)
2	To practice RS and GIS tools and techniques using RS and GIS data and data products
3	To provide students hands on experience on processing RS and GIS data and use the advanced

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Practice theory and concepts of RS and GIS	Apply
CO2	Verify and process data and data products of RS and GIS using tools/software	Evaluate
CO3	Design solutions for various interdisciplinary problems using RS and GIS tools/software and advanced concepts in computer science and engineering (DIP, RDBMS, ML, etc.).	Create

Mini Project Guidelines

Course Contents:

Assignments

1. Describe the History of Remote Sensing.
2. Explain the significance of EMR in remote sensing?
3. Identify the different types of Electromagnetic radiation?
4. Describe about the spectral signature concepts.
5. Identify, what are the characteristic of EMR interaction with soil particles.
6. Describe as how does EMR interact with Ozone?
7. List out the differences between raster and vector data models.
8. Find out what are the common errors that occur in GIS database
9. Identify as how data editing is done in GIS.
10. What are the necessary guidelines that should be taken in to consideration in order to minimize errors in GIS?
11. Describe the importance of GIS in planning.

Text Books

1	Chandra, A.M. and Gosh, S.K., "Remote Sensing and GIS", Narosa Publishing House. 2008

2	Lo, C.P. and Young, A.K.W., "Concepts and Techniques of Geographical Information System", Prentice Hall India. 20012
References	
1	Lillesand, T.M. and Kieffer, "Remote Sensing and Image Interpretation", John Wiley and Sons, 6th Edition. 2012
2	Chang, K, "Introduction to Geographical Systems", Tata McGraw-Hill, 4th Edition. 2010
Useful Links	
1	NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ce08 https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce10

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			
CO2	2			2		
CO3	3	2		2		2
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO573
Course Name	Pre-dissertation work and seminar
Desired Requisites:	Programming knowledge

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week	Nil			
Interaction	-	**Credits: 1**			

Course Objectives

1	to find a high-quality research topic
2	to develop a convincing research proposal
3	to craft a high-quality introduction and literature review
4	to choose a suitable methodology and present your results
5	to polish your dissertation or thesis for the highest marks

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Developing research based knowledge	Apply
CO2	Creating research based work	Create

Module Contents

Course Contents:

Module I: Introduction.
Module II: Review of Literature.
Module III: Methodology (Research Design & Methods)
Module IV: Presentation of Research (Results)
Module V: Summary, Implications, Conclusions (Discussion)
This second course of a two-semester sequence is designed to assist students in developing a dissertation proposal consisting of three chapters. This includes working to develop a clearly defined research idea, introduction, literature review, theoretical/conceptual framework, and research design. The Dissertation Seminar sequence will also provide networking opportunities with students in a similar place in their graduate studies as well as professional development designed to help students complete the dissertation after finishing the course sequence.

Assignments

1. Review paper publication

Text Books

1	HANDBOOK OF RESEARCH METHODOLOGY

	• August 2017 • Edition: 1 • Publisher: Educreation • ISBN: 978-1-5457-0340-3
2	

References	
1	Different research papers
2	

Useful Links	
1	NPTEL LECTURES

CO-PO Mapping

	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3		1			2									
CO2			1		1										

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)

Bloom's Taxonomy Level	LA1	LA2	ESE	Total
Remember				
Understand				
Apply	20	10	20	50
Analyze				
Evaluate	10	20	20	50
Create				
Total Marks	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech.
Class, Semester	First Year M. Tech.CSE Sem II
Course Code	6OE509
Course Name	Machine Learning in practice
Desired Requisites:	Basic mathematics and python programming

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**ISE**	**MSE**	**ESE**	**Total**
Tutorial	-	20	30	50	100
Practical	-				
Interaction	-	**Credits: 3**			

Course Objectives

1	To introduce python and mathematical concepts required for machine learning
2	To prepare data for machine learning
3	To implement supervised and unsupervised learning algorithm

Course Outcomes (CO) with Bloom's Taxonomy Level

CO1	Apply different data pre-processing techniques required for data preparation.	Apply
CO2	Identify and implement different machine learning algorithms to solve real life problems.	Analyze
CO3	Evaluate and compare performance of the machine learning algorithms.	Evaluate

Module	**Module Contents**	**Hours**
I	**Introduction to Machine Learning** Introduction, Types of machine learning, Applications of Machine Learning, Python basics: basic constructs of python, pandas, NumPy, Matplotlib for data visualization	6
II	**Data pre-processing** Data Cleaning: handling missing values, removing noise from data, handling categorical features, Feature selection and reduction, Data normalization, Train/test split, cross-validation	6
III	**Supervised Learning-I** Linear regression, multiple regression, MSE, RMSE Classification using Naïve Bayes classifier, Decision tree classifier, KNN, logistic regression	8
IV	**Supervised Learning-II** Ensemble models: tree-based algorithms, Bagging, Boosting, Stacking **Model Performance** Confusion matrices, accuracy, precision, recall, F1 score, Hyperparameter tuning, deployment	8
V	**Unsupervised Learning** Clustering- K means clustering, HDBSCAN, Dimensionality reduction using PCA.	5
VI	**Reinforcement learning and Case study** Introduction to reinforcement learning, Types, elements and applications of Reinforcement learning, Case studies based on various applications of machine learning algorithms in real life.	6

Text Books

1	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2	Introduction to Machine Learning Edition 2, by Ethem Alpaydin.
3	

References	
1	
2	
3	

Useful Links	
1	NPTEL 'Introduction to Machine learning' -Link
2	

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	2	2				
CO2				3		
CO3	1		1			2

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High.
Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on 1 in-semester examinations in the form of ISE of 20 marks and MSE of 30 Marks. Also, there is End-Sem examination (ESE) of 50 marks. MSE shall be typically on modules 1 2 and 3, ISE based typically on all the modules and ESE shall be on all modules with nearly 30% weightage on first 3 modules and 70% weightage on modules 4, 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course

Bloom's Taxonomy Level		ISE	MSE	ESE	Total
1	Remember				
2	Understand				
3	Apply		15	20	35
4	Analyse		15	20	35
5	Evaluate	20		10	30
6	Create				
Total		**20**	**30**	**50**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO575
Course Name	Data Encryption and compression Lab
Desired Requisites:	Encryption and decryption techniques.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	to introduce classical encryption techniques and concepts of modular arithmetic and number theory..
2	To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Apply different encryption techniques	Apply
CO2	Compare and evaluate different cryptographic algorithms	Evaluate
CO3		

Experiment Guidelines

Experiment list:

1. To implement Huffman coding.
2. To implement Arithmetic Coding.
3. To implement μ law encoding
4. To implement one dimension DCT
5. To implement two dimension DCT
6. To implement Chinese Remainder Theorem
7. To implement Ceaser Cipher Algorithm
8. To implement RSA Algorithm
9. To implement Diffie-Hellman Key exchange

Text Books

1	Data Compression . David Salomon , Springer Publication, 4th Edition.
2	Introduction to Data Compression, Khalid Sayood, Morgan Kaufmann Series, 3rd Edition
3	Cryptography and Network Security, William Stallings, Pearson Education Asia Publication, 5th Edition.
4	Cryptography and Network Security, Behrouz Forouzan, McGraw-Hill, 1st Edition.

References	
1	Cryptography and Network Security, Behrouz Forouzan, McGraw-Hill, 1st Edition.
2	The Data Compression Book, Mark Nelson, BPB publication, 2nd Edition
3	Applied Cryptography, Bruce Schnerer, John Willey & Sons Inc. Publication, 2nd Edition
Useful links	
1	NPTEL lectures

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO574
Course Name	Natural Language processing Lab
Desired Requisites:	NLP concepts

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To introduce the students with the basics of NLP.
2	empower students for developing advanced NLP tools and solving practical problems in the field
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	assistants that are used in various business fields/areas	Apply
CO2	Develop the knowledge of NLP	Create
CO3		

Experiment Guidelines

Experiment list:

1. Preprocessing of text (Tokenization, Filtration, Script Validation, Stop Word Removal, Stemming)
2. Morphological Analysis
3. N-gram model
4. POS tagging
5. Chunking
6. Named Entity Recognition
7. Virtual Lab on Word Generator
8. Mini Project based on NLP Application

Text Books

1	Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems by Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana (Published on June 17, 2020)
2	Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning by Delip Rao, Brian McMahan (Published on February 19, 2019)

References

1	Natural Language Processing in Action: Understanding, analyzing, and generating text with Python by Hobson Lane, Hannes Hapke, Cole Howard (Published on April 14, 2019)
2	
3	
Useful links	
1	http://nlp-iiith.vlabs.ac.in/

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO579
Course Name	ADVANCED DAATABASE SYSTEM LAB
Desired Requisites:	DATABASE MANAGEMENT SYSTEM

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To explore the features of a Database Management Systems
2	To interface a database with front end tools
3	To understand the internals of a database system

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Ability to use databases for building web applications.	Apply
CO2	Gaining knowledge about the internals of a database system.	Create
CO3		

Mini Project Guidelines

Course Contents:

1. Basic SQL
2. Intermediate SQL
3. Advanced SQL
4. ER Modeling
5. Database Design and Normalization
6. Accessing Databases from Programs using JDBC
7. Building Web Applications using PHP & MySQL
8. Indexing and Query Processing
9. Query Evaluation Plans
10. Concurrency and Transactions
11. Big Data Analytics using Hadoop

Text Books

1	1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011

2	

References	
1	1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007
2	
3	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO578
Course Name	Network Security Lab
Desired Requisites:	Basics of computer network

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	implies that unauthorized individuals mustn't have any sort of access to the info .
2	Integrity for data means changes made to data are done only by authorized individuals/systems.
3	**Availability:** this is applicable to systems and to data.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Understanding security architectures, protocols and services in both wired and wireless networks	UNDERSTAND
CO2	Understand the role of security protocols in securing networks	APPLY
CO3	Discover, analyze and identify security issues in the network.	APPLY
CO4	Evaluate the use of an IDS and IPS in a working environment	ANALYZE
CO5	Apply security mechanisms, security policies, security components (such as protection domains and firewalls), port security and protection to secure networks	CREATE

Mini Project Guidelines

Course Contents:

1. Make a Detailed Report on Network Security Threats covering Structured, Unstructured, Internal and External Threats

2. Perform the following Scan using Wireshark and analyze your results

(a)Analyze TCP session

(b) Perform and analyze these scans

(i) Start a Wireshark capture. Open a Windows-> command window and perform a Host Scan (using ICMP packets) on a neighbours machine using nmap –sP [neighbors ip address]. Stop the capture and filter the traffic for ARP and ICMP packets.(ii)Start a new Wireshark capture, and then perform a host scan (ICMP scan) on a system out with the subnet, such as nmap –sP scanme.nmap.org.(Stop the capture and filter the traffic for ARP and ICMP packets and Compare

with previous results.

(iii) Start a new Wireshark capture, and then perform a complete Port Scan (in this case a TCP SYN scan) and an Operating System Fingerprint on a neighbours machine using nmap –O [neighbours ip address] . The –O option should provide the OS running on the scanned machine.Stop the capture and filter for source address == your machines address if necessary.

3. To Analysis Network using Wireshark for

(a)Traffic Monitoring (TCP slow down and HTTP slow down)

(b) Packet Sniffing

4. Explore , execute and analysis traffic using TCP Dump and Net discover tools

Software

5. To explore Shodan for (a) locating Boats and Ship Locations (b) Searching and capturing Live Cameras. (b) To Write a small NSE Script

6. To spoof IP address of your own system using Kali Linux

7.To sniff traffic using ARP Spoofing

8. To perform man in middle attack using DNS spoofing

9.To perform UDP session hijacking using Scapy

10.To perform TCP session hijacking using Shijack.

11. Write and execute commands

• To view routing Table

• To view network statistics of a network

• To view all routes

• To update/modify/add/delete routes in a routing table

12. To Perform HTTP Session Hijacking through Cookie stealing

13. Configuring IPSec VPN Tunnel Mode using Packet Tracer

14.Decryption SSl/TLS Traffic using Wireshark

15. To Configure AAA (TACACS+) on Packet Tracer for User Authentication

16. User account Using TACACS AND RADIUS ON PACKET TRACER

17. Configure Numbered ACL for a given topology.

18. Perform Wireless Hacking using aerodumpng

Text Books	
1	B William Stallings, " Network Security Essentials (Applications and Standards)", Pearson Education., 5th Edition,2011
2	Ryan Russell, " Hack Proofing your network ", Wiley,2nd Edition,2002
References	
1	Karen Scarf one, “Guide to Intrusion and prevention System”, NIST Special Publication, 2nd Edition,2007
2	
Usefull Links	
1	https://nptel.ac.in/syllabus/syllabus.php?subjectId=106105031
2	https://www.cybrary.it/course/security-for-beginners/
3	https://www.udemy.com/topic/Network-Security/
4	https://www.coursera.org/courses?query=network%20security
5	https://www.edx.org/learn/network-security

CO-PO Mapping

	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1			2			2
CO2				2	2	
CO3	1			2		
CO4		2			1	
CO5			2	1		2

The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30

ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom's Taxonomy Level (Marks)				
Bloom's Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	M.Tech. (Computer science and engineering)
Class, Semester	First Year M. Tech., Sem II
Course Code	6CO577
Course Name	Machine Learning Lab
Desired Requisites:	Data Science

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	2 Hrs/Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	To formulate machine learning problems corresponding to different applications.
2	To illustrate a range of machine learning algorithms along with their strengths and weaknesses.
3	To apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO1	Implement a range of machine learning algorithms along with their strengths and weaknesses.	Apply
CO2	Apply machine learning algorithms to solve typical problems in Machine Learning.	Apply
CO3	Analyze various machine learning tools	Analyze

Mini Project Guidelines

Course Contents:

Implement the following using Machine Learning

1. Implement linear regression using python.
2. Implement Naïve Bayes theorem to classify the English text.
3. Implementation of feature selection and extraction algorithm.
4. Implementation of logistic regression.
5. Implementation of KNN algorithm.
6. Implementation of decision tree.
7. Implementation of Naïve Bayesian classifier.
8. Implementation of Bayesian network.
9. Clustering Based on EM algorithm.
10. Clustering Based on k-Means algorithm.
11. Implementation of evaluation techniques.
12. Implementation of back propagation for ANN.

Text Books

1	T. Hastie, R. Tibshirani, J. Friedman,"The Elements of Statistical Learning", 2e, 2008
2	2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer 2016

References	
1	Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani , “Introduction to Statistical Learning”, Springer, 2013
2	Richard Duda, Peter Hart, David Stork, “Pattern Classification”, John Wiley & Sons, 2e,2001
3	NPTEL online course by Prof. Balaraman Ravindran on “Introduction to Machine Learning”

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	**2**	**3**	**4**	**5**	**6**
CO1	2		2	1		
CO2		1	1	2		
CO3			2	3	2	2
The strength of mapping is to be written as 1,2,3; Here, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Assessment Plan based on Bloom’s Taxonomy Level (Marks)				
Bloom’s Taxonomy Level	**LA1**	**LA2**	**ESE**	**Total**
Remember				
Understand				
Apply	20	10	5	35
Analyze	10	10	10	30
Evaluate		10	10	20
Create			15	15
Total	**30**	**30**	**40**	**100**