

Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) VIII Semester (Computer Science & Engineering)

w.e.f. July 2023

w.e.f. July 2023													
S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical			L	T	P	
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work					
1	CS81	PEC/DLC	Professional Elective Course-IV	70	20	10	-	-	100	3	1	-	4
2	CS82	OEC/DLC	Open Elective Course-III	70	20	10	-	-	100	3	1	-	4
3	CS83	PI	Major Project / Internship	-	-	-	150	100	250	-	-	16	8
Total				140	40	20	150	100	450	6	2	16	16

Note: 1. Departmental BOS will initiate the process for the award of marks for the above courses.

Note: 1. Departmental BOS will decide list of three/four optional subjects those are available in MOOC/NPTEL, PEC as well for OEC.

Professional Elective Course-IV		
S.No.	Subject Code	Subject Name
1	CS81A	Computational Intelligence
2	CS81B	Natural Language Processing
3	CS81C	Network Management

Open Elective Course-III		
S.No.	Subject Code	Subject Name
1	CS82A	Ethical Hacking
2	CS82B	Data Analytics
3	CS82C	Data Warehouse & Mining

Note: 2. Students going for internship would have to opt MOOC/NPTEL subjects decided / listed by the HOD / Coordinator.

Professional Elective Course-IV		
S.No.	Subject Code	Subject Name
1	CS81D	NPTEL-1
2	CS81E	NPTEL-2
3	CS81F	NPTEL-3

Open Elective Course-III		
S.No.	Subject Code	Subject Name
1	CS82D	NPTEL-4
2	CS82E	NPTEL-5
3	CS82F	NPTEL-6

Note: 3. For Major Project/ Internship, evaluation is based on work done, quality of report, presentation and performance in viva-voce through department project supervisor / Industry Project Coordinator.

1 hour lecture (L) = 1 credit

1 hour Tutorial (T) = 1 credit

2 hour Practical (P) = 1 credit

PEC: Professional Elective Course, OEC: Open Elective Course, PI: Project and Internship, DLC: Distance Learning Course



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		End Sem	Mid Sem Exam	Quiz, Assignment	End Sem	Lab Work	Total Marks				
CS81A	Computational Intelligence	70	20	10	-	-	100	3	1	-	4

Course Contents:

Module-I: Introduction to Computational Intelligence; types of Computational Intelligence, components of Computational Intelligence. Concept of Learning/Training model. Parametric Models, Nonparametric Models. Multilayer Networks: Feed Forward network, Feedback network.

Module-II: Fuzzy Systems: Fuzzy set theory: Fuzzy sets and operations, Membership Functions, Concept of Fuzzy relations and their composition, Concept of Fuzzy Measures; Fuzzy Logic: Fuzzy Rules, Inferencing; Fuzzy Control - Selection of Membership Functions, Fuzzification, Rule Based Design & Inferencing, Defuzzification.

Module-III: Genetic Algorithms: Basic Genetics, Concepts, Working Principle, Creation of Offsprings, Encoding, Fitness Function, Selection Functions, Genetic Operators-Reproduction, Crossover, Mutation; Genetic Modeling, Benefits.

Module-IV: Rough Set Theory - Introduction, Fundamental Concepts, Set approximation, Rough membership, Attributes, Optimization. Hidden Markov Models, Decision tree model.

Module-V: Introduction to Swarm Intelligence, Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc. Applications of Computational Intelligence.

Suggested Books:

1. Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers.
2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley Publishing.
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall.
4. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine Learning, Pearson Education.
5. Jagdish Chand Bansal, Pramod Kumar Singh, Nikhil R. Pal, Evolutionary and Swarm Intelligence Algorithms, Springer Publishing, 2019.
6. S. Rajasekaran, G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms Synthesis and Applications".
7. J.S. Roger Jang, C.T. Sun, E. Mizutani, 'Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning & Machine Intelligence', PIIl., 2002.

Computational intelligence (CS81A)

Course Outcomes: After completion of the course, Students will be able to:


CO1: Describe in depth theories, methods, algorithms and learning models in Computational Intelligence.

CO2: Compare and contrast traditional algorithms with nature inspired algorithms.

CO3: Examine the nature of a problem and determine whether a computation intelligent technique/algorithm can solve it efficiently enough.

CO4: Design and implement Computational Intelligence algorithms and approaches for solving real life problems.




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CS81B	Natural Language Processing	70	20	10	-	-	100	3	1	-	4

Course Content:

Module I: Introduction to NLP and Text Classification and Sentiment Analysis

Basics of NLP and its Applications. Text Preprocessing and Tokenization. Regular Expressions, Finite-State Automata - English Morphology, Transducers for lexicon and rules, Detecting and Correcting Spelling Errors, Minimum Edit Distance NLP Libraries and Tools. Text Classification Techniques. Sentiment Analysis and Opinion Mining. Building a Text Classifier.

Module II: Named Entity Recognition and Part-of-Speech Tagging and Language Models and Word Embeddings: Named Entity Recognition (NER). Part-of-Speech Tagging (POS). Information Extraction. Introduction to Language Models. Word2Vec and Word Embeddings. Pretrained Language Models

Module III: Text Generation and Language Modeling and Machine Translation and Language Understanding: Recurrent Neural Networks (RNNs), LSTM and GRU for Text Generation. Sequence-to-Sequence Models Machine Translation Models Language Understanding with Attention Mechanisms. Multilingual NLP.

Module IV: Information Retrieval and Document Summarization And Advanced Text Representation: Text Retrieval Models (TF-IDF, BM25). Document Similarity and Clustering. Text Summarization Techniques. Contextual Embeddings (e.g. BERT, GPT-3). Transformers and Self-Attention Mechanism

Module V: Sentiment Analysis and Emotion Detection And Advanced Sequence-to-Sequence Models: Emotion Classification in Text. Fine-Grained Sentiment Analysis. Sarcasm and Irony Detection. Transformer-Based Sequence-to-Sequence Models. Neural Machine Translation Abstractive Text Summarization.

Suggested Books:

1. Daniel Jurafsky, James H. Martin-Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication.
2. Steven Bird, Ewan Klein and Edward Loper, -Natural Language Processing with Python, First Edition, O'Reilly Media.
3. Breck Baldwin, -Language Processing with Java and LingPipe Cookbook, Atlantic Publisher.
4. Richard M Reese, -Natural Language Processing with Java, O'Reilly Media.
5. Nitin Indurkha and Fred J. Damerau, -Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press.
6. Tanveer Siddiqui, U.S. Tiwary, -Natural Language Processing and Information Retrieval, Oxford University Press.

Natural Language Processing (CS81B)

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


CO1: Tag a given text with basic Language features.

CO2: Design an innovative application using NLP components.

CO3: Implement a rule based system to tackle morphology/syntax of a language.

CO4: Design a tag set to be used for statistical processing for real-time applications.

CO5: Compare and contrast the use of different statistical approaches for different types of NLP applications.



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CS81C	Network Management	70	20	10	-	-	100	3	1	-	4

Course Content:

Module I: Introduction to Network Managements: Network Management Framework, Network Based Managements, Evolution of Network Management: SGMP, CMIP, SNMP. Network Implementation and Management Strategies, Network Management Categories: Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralised Configuration, Distributed Configuration. Selected Management Strategy.

Module II: Management Information Base (MIB), Structure of Management Information, NMS Presentation of the sMI, NMS Meter-ware Network view. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface (DMI), DMI Architecture, DMI Browser, DMVSNMp Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

Module III: OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, Subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARp Packet format, RARP Examples, RARP server design.

Module IV: Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table. and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragnrentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF). BGP, GGP. Private Netrvorks. Virtual Private Network (VPN), Network Address Translation (NAT).

Module V: Internet Control Message Protocols (ICMP):- Types of message, message for,at. error reporting. query. checksum" ICMP Package. IGMP, IGMP Message and its operation, IcMp package. Transmission control protocol, Process-to-Prooess Communication. TCP Services Flow Control, TCP Timers. TCP Operation, TCP Package. Application layers protocols Telnet Protocol. File Transfer Protocol (FTP), Simple Mail 'Transfer Protocol (SMTP). X-Window system protocol, Remote procedure call, and Network file system.

Suggested Books:

1. Forouzan. TCP/IP Protocol Suite 4th edition, TMH
2. J.RichardBurkey. Netrvork Management Concept and Practice. PHI
3. Stevens,'TCP/IP Illustrated Volume-I, Pearson
4. Tittel:TCP/IP, Cenage Learning
5. TCP/IP and related protocols, McGraw Hill.
6. DougJrals E. Comer, Internet working with TCP/IP Vol. I, Principles" Protocols, and Architecture, Prentice Hall,India.

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Network Management (CS81C)

Course Outcomes: On successful completion of the course, the students will be able to:

C01: Explain and demonstrate Network Management Architecture, Routing & Protocols used for Network

Management.

C02: Select Routing methods and Protocols for Network Based Management and Construct Computer Network.

C03: Compare Routing Strategies, Network Configuration and various Protocols.

C04: Select Network Management Protocols and maintain the network by performing a routine maintenance task



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CS82A	Ethical Hacking	70	20	10	-	-	100	3	1	-	4

Course Content

Module I: Introduction to Ethical Hacking: Types of Data Stolen From the Organizations, Effects of Hacking, benefits of ethical hacking, Hacker: Types of Hackers: white hat, black hat, grey hat, red hat, blue hat etc., Hacktivism.

Ethical Hacking legal, professional and ethical issues, roles and responsibility of ethical hackers: ethical responsibilities, making appropriate use of the tools and techniques associated with ethical hacking.

Module II: Introduction to cryptography, Elements of Information Security, Types of Attacks, security measures, malware, trojans, keyloggers. Introduction to Kali linux and VirtualBox.

Module-III: Footprinting And Social Engineering: Footprinting Types Footprinting Objectives, Methods and Web Tools for Footprinting, Google Hacking, Scanning networks: identifying targets, port discovery, Enumeration. Social Engineering, Host Reconnaissance. Vulnerability Analysis: Vulnerability Assessment Concepts.

Module-IV: Attacks and protection: Password Attacks: Password Cracking, Authentication, Privilege Escalation. Malware Attacks, Types of Malware, Malware Analysis. Sniffing Attack, Spoofing, Countermeasures techniques against Sniffing. Denial of Service Attack, Attack Techniques, Tools & Services. IDS & IPS, Firewall, Honey pots.

Module V: Hacking Web Applications: Understanding Security in Web Applications, Tools for Web Application Hacking, Hacking Web Server, Database, Routers, Session Hijacking. SQL Injection, Understanding SQL Queries, The Mechanics of SQL Injection Attacks, Discovering Schema and Extracting Data, Blind SQL Injection. Penetration Testing, cross-site scripting, Email Hacking, hacking Wireless networks: common threats, Bluetooth Hacking, Mobiles Phone Hacking.

Suggested Books:

1. Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and Network Defense", Second Edition, CENGAGE Learning.
2. Review Guide", CENGAGE Learning.
3. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series -Elsevier.
4. Whitaker & Newman, "Penetration Testing and Network Defense" ,Cisco press Indianapolis



Ethical Hacking (CS82A)




Course Outcomes: Upon completion of the course, the students will be able to.

CO1: Understand how intruders escalate privileges.

CO2: Understand intrusion Detection, Policy Creation, Social Engineering, Buffer.

CO3: Define overflows and different types of Attacks and their protection mechanism.

CO4: Learn about ethical laws and tests.

  
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CS82B	Data Analytics	70	20	10	-	-	100	3	1	-	4

Course Content:

Module I: Data Definitions and Analysis Techniques: Elements, Variables, and Data categorization, Levels of Measurement, Data management and indexing Introduction to Statistical Concepts: Sampling Distributions, Resampling, Statistical Inference, and R-Programming Descriptive Statistics Measures of central tendency Measures of location of dispersions.

Module II: Basic Data analysis techniques: Statistical hypothesis generation and testing, Chi-Square test, t-Test Analysis of variance Correlation analysis, Maximum likelihood test

Module III: Advance Data analysis techniques: Regression Modelling, Multivariate Analysis, Bayesian Modeling, Inference And Bayesian Network, Regression analysis, Classification techniques, Clustering Techniques, Clustering Association rules analysis

Module IV: Frameworks and Visualization: MapReduce - Hadoop, Hive, MapR - Sharding - NoSQL Databases - 53 - Hadoop Distributed File Systems - Visualisations - Visual Data Analysis Techniques, Interaction Techniques; Systems and Applications

Module V: Case studies and projects: Understanding business scenarios, Feature engineering and visualisation, Scalable and parallel computing with Hadoop and Map-Reduce Sensitivity Analysis, Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

Suggested Books:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer.
2. AnandRajaraman And Jeffrey David Ullman, Mining Of Massive Datasets, Cambridge University Press.
3. Bill Franks, Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics, John Wiley & Sons.
4. Glenn J. Myatt, Making Sense Of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly.






Data Analytics (CS82B)

Course Outcomes:

- CO1: Demonstrate specialist knowledge of how a range of data sources and analytical methods are used to inform decision making across multiple domains.
- CO2: Understand Big Data and its analytics in the real world.
- CO3: Analyse the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics.
- CO4: Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm.



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CS82C	Data Warehouse & Mining	70	20	10	-	-	100	3	1	-	4

Module-I: Data Warehouse: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Data warehouse schema, Partitioning strategy Data warehouse Implementation, Data Marts, Meta Data, and Example of a Multidimensional Data model. Introduction to Pattern Warehousing.

Module-II: OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup and Recovery.

Module-III: Introduction to Data & Data Mining: Data Types, Quality of data, Data Preprocessing, Similarity measures, Summary statistics, Data distributions, Basic data mining tasks, Data Mining V/s knowledge discovery in databases. issues in Data mining. Introduction to Fuzzy sets and fuzzy logic.

Module-IV: Supervised Learning: Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, neural network-based algorithms, Rule-based algorithms, Probabilistic Classifiers Advanced techniques: Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). Bayesian approach to classifying text Web mining: classifying web pages, extracting knowledge from the web Data Mining software and applications

Module-V: Clustering & Association Rule mining: Hierarchical algorithms, Partitional algorithms, Clustering large databases BIRCH, DBSCAN, CURE algorithms, Association rules: Parallel and distributed algorithms such as Apriori and FP growth algorithms.

Suggested Books:

1. Pang-Ning Tan, Steinbach & Kumar, "Introduction to Data Mining", Pearson Education.
2. Data Mining Techniques; ArunK.Pujari; University Press.
3. Jiawei Han, Micheline Kamber, "Data Mining : Concepts and Techniques", Morgan Kaufmann Publishers.
4. Anahory & Murray, "Data Warehousing in the Real World", Pearson Education.
5. Margaret H. Dunham, "Data Mining : Introductory and Advanced topics", Pearson Education.
6. Data Mining: Adriaans & Zantinge; Pearson education.
7. Mastering Data Mining; Berr, Linoff; Wiley.

Data Warehouse & Mining (CS82C)

Course Outcomes: Upon completion of the course, the students will be able to
CO1: Understand the functionality of the various data mining and data warehousing components.

CO2: Analyse OLAP tools.

CO3: Apply Data Mining Techniques and methods on large data sets.

CO4: Compare and contrast classification and prediction techniques.

CO5: Explain data mining tools on various applications and understand the basics of big data analytics.



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