राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर

**NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR**

(Institute of National Importance)

G.E. Road, Raipur – 492010 (CG)

Phone: (0771) 22 54 200
Fax:    (0771) 22 54 600
Email: director.nitrr@rediffmail.com
Website: www.nitrr.ac.in

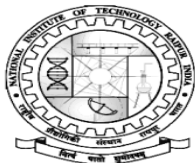| National Institute of Technology Raipur | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Computer Application | | | | | | | | | | | |
| Course of Study and Scheme of Examination | | | | | | MCA 5th Semester | | | | Branch:CA | |
| S. No. | Subject Code | Subject Name | Periods per Week | | | TA | Examination Scheme | | | | Total Marks | Credits |
| | | | | | | | MSE/MTR | | ESE/ESVE | | | |
| | | | L | T | P | | Theory | Prac. | Theory | Prac. | | |
| 1 | CA405101CA | Distributed Computing | 3 | 1 | 0 | 20 | 30 | – | 50 | – | 100 | 4 |
| 2 | CA4052**CA | Elective-III | 2 | 1 | 0 | 20 | 30 | – | 50 | – | 100 | 3 |
| 3 | CA4052**CA | Elective-IV | 2 | 1 | 0 | 20 | 30 | – | 50 | – | 100 | 3 |
| 4 | CA4053##CA | Open Elective-II | 2 | 1 | 0 | 20 | 30 | – | 50 | – | 100 | 3 |
| 5 | CA405401CA | Computer Lab-501 | 0 | 0 | 4 | 40 | – | 20 | – | 40 | 100 | 2 |
| 6 | CA405501CA | Minor Project-502 | 0 | 0 | 8 | 40 | – | 20 | – | 40 | 100 | 4 |
| | | | | | | | | | | | 19 |

**, ## are number to be filled from list of electives (Program and Open) prepared and maintained by the department

| Program Elective-III | | Program Elective-IV | | Open Elective-II | |
|---|---|---|---|---|---|
| Subject Code | Subject Name | Subject Code | Subject Name | Subject Code | Subject Name |
| CA405201CA | 1. Quantum Computing | CA405202CA | 1. Parallel Processing | CA405301CA | 1. Digital Image Processing |
| CA405203CA | 2. Cloud Computing | CA405204CA | 2. Swarm Intelligence & Evolutionary Algorithms | CA405302CA | 2. Pattern Recognition |
| CA405205CA | 3. Enterprise Resource Planning | CA405206CA | 3. Mobile Computing | | |
| CA405207CA | 4. Cyber Law | CA405208CA | 4. Biometrics | | |
| CA405209CA | 5. Decision Support System | CA405210CA | 5. Information Retrieval | | |
| | | CA405211CA | 6. Software Defined Network | | |
| | | CA405212CA | 7. Software Testing | | |
| | | CA405213CA | 8. Software Architecture and Management | | |

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## Semester V

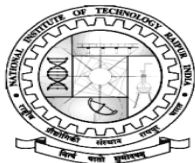| 1. | Department proposing the course | Computer Applications |
|----|--------------------------------|------------------------|
| 2. | Course Title | Distributed Computing |
| 3. | L-T-P Structure | 3-1-0 |
| 4. | Credits / # of period | 04/42 |
| 5. | Course number(Code) | |
| 6. | Status (Core/Elective) | Core |
| 7. | Pre-requisites(course no./title) | Operating Systems and Computer Network |
| 8. | Frequency of offer | |
| 9. | Course Objectives: <br><br> 1. Learn the basics of distributed computing and network communication. <br> 2. Learn about IPC and Message passing in distributed computing. <br> 3. Understand RPC and Scheduling algorithm. <br> 4. Understand the concept of Distributed Shared Memory and Naming. | |
| 10. | Course Syllabus: <br><br> **Unit-1** <br><br> **Introduction to distributed computing:** Evolution of Distributed Computing, Motivation, objectives, characterization & classification of distributed systems, Distributed system architecture, Hardware & software issues, System Models, Distributed computing environment, Design issues in distributed system. Coordination, synchronization & consistency: Logical clocks, Physical clocks, mutual exclusion, election algorithms, atomic broadcast, sequential consistency transaction distributed consensus. <br><br> **Unit-2** <br><br> **Models of distributed computing:** Models of distributed computing: Client server, exceptions, underlying protocols, IDL, marshalling etc. Group models and peer to peer: Groups for service replication/ reliability, groups for parallelism and performance, client/ server vs. peer-to-peer, multicast, atomic broadcast. **Inter process Communication:** API for Internet protocols. External data representation and Marshalling. Client-Server communication and Group communication. Distributed Objects and Remote Invocation- Communication between distributed objects, Events and notifications. <br><br> **Unit-3** <br><br> **Remote communication and Distributed system management:** Introduction to RPC: Model, Transparency, Implementation, Stub generation messages and Communication protocols for RPCs. Distributed system management: Task assignment approach, Load Balancing approach, Load Sharing Approach, Deadlocks in Distributed systems, Deadlocks in Message communication. <br><br> **Unit-4** <br><br> **Distributed Shared Memory and Naming:** Distributed Shared Memory: Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems, Naming: Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security. | |

# राष्ट्रीय प्रौद्योगिकी संस्थान रायपुर
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|---|---|
| 11. | **Text Books:**<br><br>1. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University Press<br>2. Distributed Operating System – P.K.Sinha, PHI, 2008. |
| 12. | **Reference Books :**<br><br>1. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg, Pearson Education<br>2. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, Hagit Attiya and Jennifer Welch, Wiley India |

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**Semester-V**

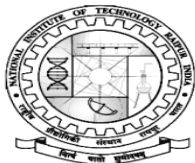| 1. | Department proposing the course | Computer Applications |
|---|---|---|
| 2. | Course Title | Cloud Computing |
| 3. | L-T-P Structure | 2-1-0 |
| 4. | Credits / # of period | 03/32 |
| 5. | Course number(Code) | |
| 6. | Status (Core/Elective) | Elective |
| 7. | Pre-requisites(course no./title) | |
| 8. | Frequency of offer | |
| 9. | Course Objectives: <br><br> 1. This course will help the students to get familiar with cloud computing fundamentals. <br> 2. The objective of the course is to study various platforms for cloud computing. <br> 3. To motivate students to do programming and experiment with the various cloud computing environments. <br> 4. To explore the applications based on cloud computing. | |
| 10. | Course Syllabus: <br><br> **Unit-1** <br><br> **Introduction:** Cloud computing at a glance: vision of cloud computing, defining a cloud, Historical development, Building cloud computing Environments, Types of cloud, Cloud Service Models: Software as a Service (SaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS). <br><br> **Unit-2** <br><br> **Virtualization:** <br> Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples. <br><br> **Unit-3** <br><br> **Cloud Computing Architecture:** Cloud Reference Model, Economics of the Cloud, Open Challenges, Cloud Application Platform, Cloud Programming and Management High-Throughput Computing: Task Programming: Task Computing, Task-based Application Models. <br><br> **Unit 4** <br><br> **Cloud Application and Development:** Cloud Application Development Platforms: Amazon web services, Google App Engine, Microsoft Azure, Scientific Applications, Business and consumer applications, Advanced Topics in Cloud Computing: Energy efficiency in clouds, Market-based management of clouds, Introduction to green computing. | |

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|---|---|
| 11. | **Text Books:**<br><br>1. Mastering Cloud Computing Foundations and Applications Programming: Rajkumar Buyya, Christian Vecchiola, S.ThamaraiSelvi - Morgan Kaufmann (2013).<br>2. Barrie Sosinsky, "Cloud Computing Bible" John Wiley & Sons, 2011. |
| 12. | **Reference Books :**<br><br>1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier, 2013.<br>2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009. |

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**Semester V**

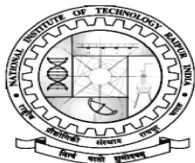| 1. | Department proposing the course | Computer Applications |
|---|---|---|
| 2. | Course Title | Swarm Intelligence & Evolutionary Algorithms |
| 3. | L-T-P Structure | 2-1-0 |
| 4. | Credits / # of period | 03/32 |
| 5. | Course number(Code) | |
| 6. | Status (Core/Elective) | Elective |
| 7. | Pre-requisites (course no./title) | Knowledge of complexity classes of P, NP, NP-Hard, NP-Complete, C language |
| 8. | Frequency of offer | |
| 9. | Course Objectives : <br><br> 1. To understand the concepts of heuristics, metaheuristic techniques and approximation methods. <br> 2. To introduce the techniques of Swarm and Evolutionary Algorithms <br> 3. Explore and use of SI and EAs where there are no known polynomial time algorithms for COPs. | |
| 10. | Course Syllabus: <br><br> **Unit-1** <br><br> Introduction: Approximate Methods, Heuristics, Metaheuristic Techniques and Local Search. <br><br> **Unit-2** <br><br> Introduction to Evolutionary Algorithms: Genetic Algorithms: Genetic Algorithms: Elementary Concepts, Genetic algorithm, Subset-Coded Genetic Algorithm, Permutation-Coded Genetic Algorithm, Grouping-based Genetic Algorithm. <br><br> **Unit-3** <br><br> Introduction to Swarm Intelligence Techniques: Basic concepts, examples of Swarm Intelligence Techniques such as Ant-Colony Optimization and Artificial Bee Colony Algorithm. <br><br> **Unit-4** <br><br> Warm-up to Swarm Intelligence and Evolutionary Algorithms: Introduction to implementation of swarm intelligence techniques and evolutionary algorithm on some COPs such as 0/1 Knapsack problem, TSP problem, job-scheduling problem, bin packing problem. | |

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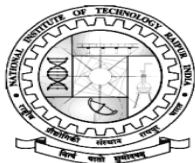| 11. | **Text Books:** |
|---|---|
|  | 1. Genetic Algorithm in Search Optimization and Machine Learning, D. E. Goldberg, Pearson Education, 1989.<br>    3. Ant-Colony Optimization, M. Dorigo and T Stutzle, PHI, 2004. |
| 12. | **Reference Books :**<br><br>1. An Introduction to Genetic Algorithms, Melanie Mitchell, PHI, 1998.<br>2. Essentials of Metaheuristics, Sean Luke, 2015, (http://cs.gmu.edu/~sean/book/metaheuristics/)<br>3. Metaheuristics: From Design to Implementation, El-GhazaliTalbi, Wiley, 2009<br>4. D.Karaboga, B.Gorkemli, C.Ozturk, N.Karaboga: A Comprehensive survey: artificial<br>5. Beecolony (ABC) algorithm and applications, Artificial Intelligence Review, vol 42, page 21-57, 2014 Springer |

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**Semester-V**

| 1. | Department proposing the course | Computer Applications |
|----|----|----|
| 2. | Course Title | Mobile Computing |
| 3. | L-T-P Structure | 2-1-0 |
| 4. | Credits / # of period | 03/32 |
| 5. | Course number(Code) | |
| 6. | Status (Core/Elective) | Elective |
| 7. | Pre-requisites(course no./title) | |
| 8. | Frequency of offer | |
| 9. | Course Objectives: <br><br> 1. To understand the basic concepts of mobile computing. <br> 2. To be familiar with the network protocol stack. <br> 3. To learn the basics of mobile telecommunication system and Ad-Hoc networks. <br> 4. To get knowledge about mobile platforms and application issues. | |
| 10. | Course Syllabus: <br><br> **Unit-1** <br><br> **Introduction to telecommunication systems Introduction:** <br> Current Wireless Systems: Overview of Paging Systems, Cordless Phones, Cellular Telephone Systems, Satellite Communication, Wireless LANs, Bluetooth, Medium access control, Telecommunication Systems, GSM Satellite Systems, Broadcast Systems Overview, Cyclic Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting. <br><br> **Unit-2** <br><br> **Wireless Standards:** <br> Wireless LAN, IEEE 802.11,Infrared Vs Radio Transmission, HIPERLAN, Bluetooth Wireless ATM, Services, Reference Model, Radio Access Layer, Location Management, Addressing Mobile Quality of Service, Access Point Control Protocol. Mobile Network Layer, Tunneling and Encapsulation, Optimization Reverse Tunneling, IPv6, DHCP, Ad-hoc Networks. <br><br> **Unit 3** <br><br> **Mobile Transport Layer & Wireless Application Protocol:** <br> Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transmission/Timeout Freezing Selective Retransmission, Transaction oriented TCP, Datagram Protocol, Transport Layer Security, Transaction Protocol, Session Protocol, Application Environment, Wireless Telephony. <br><br> **Unit 4** <br><br> **Application Issues**: <br> Dynamic DNS File System, Synchronization Protocol, Context aware applications, Security, Analysis of existing wireless network, GSM Systems Overview, Security, Data Services N/W Signaling, GSM mobility management, Operations, Administration and maintenance. | |

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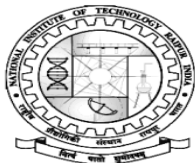(Institute of National Importance)

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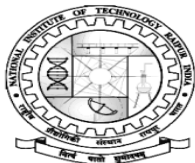| 11. | **Text Books:**<br><br>1. J Schiller, 'Mobile Communication', Addison Wesley, 2000.<br>2. John Wiley, 'Mobile Communication Design Fundamentals', 1993. |
|---|---|
| 12. | **Reference Books :**<br><br>1. Wireless Communication and Networks, Pearson Education, 2003.<br>2. WAP-Wireless Application Protocol, Pearson Education, 2003 |

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**Semester -V**

| 1. | Department proposing the course | Computer Applications |
|---|---|---|
| 2. | Course Title | Pattern Recognition |
| 3. | L-T-P Structure | 2-1-0 |
| 4. | Credits / # of period | 03/32 |
| 5. | Course number(Code) | |
| 6. | Status (Core/Elective) | Elective |
| 7. | Pre-requisites(course no./title) | |
| 8. | Frequency of offer | |
| 9. | Course Objectives: <ul><li>Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms</li><li>Understand the basic methods of feature extraction, feature evaluation, and data mining</li><li>Understand and apply both supervised and unsupervised classification methods to detect and characterize patterns in real-world data</li><li>Develop prototype pattern recognition algorithms that can be used to study algorithm behavior</li></ul> | |
| 10. | Course Syllabus: <br><br>**Unit-1**<br><br>**Introduction:** Definitions, data sets for Pattern Different Paradigms of Pattern Recognition Representations of Patterns and Classes, Metric and non-metric proximity measures Feature extraction.<br><br>**Unit-2**<br><br>Bias and Variance, Advance Classification Techniques Support Vector Machine, Boosting and Bagging Algorithms, Random Forest, Associative Classifiers.<br><br>**Unit-3**<br><br>Introduction to Neural Networks , ANN classification techniques,   Regularization , Introduction to Deep Learning , Training Deep Networks<br><br>**Unit-4**<br><br>Recent advances in Pattern Recognition, SVMs, Kernel SVM,  Combining classifiers, Statistical Pattern Recognition, Neuro fuzzy classification. | |

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| 11. | **Text Books:** |
|---|---|
| | 1.C.M. Bishop, "Pattern Recognition and Machine learning", Springer. |
| | 2.Pattern Classification,  Duda, Hart  & Stork  John Wiley. |
| | 3.Pattern Recognition and Image Analysis" by Arl Gose, Johnson baugh, Jost, PHI. |
| 12. | **Reference Books :** |
| | 1."Pattern Recognition: Technique and Applications" by Rajjan Shinghal, Oxford. |
| | 2."Pattern Recognition Principles" by J.T. Tou and R.C. Gonzalez, Addison Wesley. |
| | 3.Duda & Hart P.E, Pattern Classification and Scene Analysis, John Wiley and Sons, NY. |
| | 4.Fu K.S., Syntactic Pattern Recognition And Applications, Prentice Hall, Englewood cliffs, N.J. |

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## Computer Lab 501 (Cloud Computing)

| 1 | Create a word document of your class time-table and store on cloud with doc and pdf format. |
|---|---|
| 2 | Prepare a powerpoint presentation on the cloud on a topic of your choice. |
| 3 | Create your resume and store it on the cloud. |
| 4 | Case study on different cloud environments (e.g., Google, Zoho, OpenStack etc.). |
| 5 | Online cloud based editor (e.g., Overleaf). |
| 6 | Case study on Github (Program sharing platform). |
| 7 | Develop a program of your choice and share it for collaboration work through Github. |
| 8 | Online IDE and Code Editors to Develop Web Applications (e.g., JSFiddle, CodeSandbox, CodeAnywhere, etc.). |
| 9 | Installing and using identity management features of OpenStack. |
| 10 | Install OpenStack and use it as infrastructure as a service and use technology ownCloud. |
| 11 | Case study on Microsoft Azure. |
| 12 | Develop a Microsoft Azure Application. |
| 13 | Develop Cloud-Based Attendance System (Users have the option to log in to mark attendance, and the database also stores important information. The database works via an Azure cloud which bridges the application and the cloud server via the internet). |
| 14 | Develop ownCloud and Incorporate the security features. |
| 15 | Mini project: using different features of cloud computing. |