

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES**

**DEVI AHILYA UNIVERSITY, INDORE**

**M. Tech.(IT) 5 Years**

**Batch 2k16**

**Semester -VIII**

**JANUARY-MAY 2020**

<b>Sub. Code</b>	<b>Sub. Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
IT-801B	Principles of Programming Language	3	1	0	4
IT-804B	Mobile and Wireless Computing	3	1	0	4
IT-803B	Artificial Intelligence	3	1	0	4
IT-802A	Software Engineering	3	1	0	4
IT-805A	Cloud Computing	3	1	0	4
	Elective –I 1.IT-808: Bio Informatics 2. IT-809: Image Processing 3. IT-810: Simulation and Modelling 4.IT-811A:Information Security 5.IT-812 :Real Time System	3	1	0	4
IT-807	Comprehensive Viva	0	0	0	4
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**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**  
**M. Tech. (5 Years) VIII Semester**  
**IT- 801B: PRINCIPLES OF PROGRAMMING LANGUAGES**

**OBJECTIVES:**

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

**UNIT I SYNTAX AND SEMANTICS**

Evolution of programming languages – describing syntax – context-free grammars – attribute grammars – describing semantics – lexical analysis – parsing – recursive-descent – bottomup parsing

**UNIT II DATA, DATA TYPES, AND BASIC STATEMENTS**

Names – variables – binding – type checking – scope – scope rules – lifetime and garbage collection – primitive data types – strings – array types – associative arrays – record types – union types – pointers and references – Arithmetic expressions – overloaded operators – type conversions – relational and boolean expressions – assignment statements – mixedmode assignments – control structures – selection – iterations – branching – guarded statements

**UNIT III SUBPROGRAMS AND IMPLEMENTATIONS**

Subprograms – design issues – local referencing – parameter passing – overloaded methods – generic methods – design issues for functions – semantics of call and return – implementing simple subprograms – stack and dynamic local variables – nested subprograms – blocks – dynamic scoping

**UNIT IV OBJECT-ORIENTATION, CONCURRENCY, AND EVENT HANDLING**

Object-orientation – design issues for OOP languages – implementation of object-oriented constructs – concurrency – semaphores – monitors – message passing – threads – statement level concurrency – exception handling – event handling

**UNIT V FUNCTIONAL AND LOGIC PROGRAMMING LANGUAGES**

Introduction to lambda calculus – fundamentals of functional programming languages – Programming with Scheme – Programming with ML – Introduction to logic and logic programming – Programming with Prolog – multi-paradigm languages

**OUTCOMES:**

- Upon Completion of the course, the students will be able to describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs
- Apply object-oriented, concurrency, and event handling programming constructs, Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

**REFERENCES:**

1. Robert W. Sebesta, “Concepts of Programming Languages”, Tenth Edition, Addison Wesley, 2012.
2. Michael L. Scott, “Programming Language Pragmatics”, Third Edition, Morgan Kaufmann, 2009.
3. R. Kent Dybvig, “The Scheme programming language”, Fourth Edition, MIT Press, 2009.
4. Jeffrey D. Ullman, “Elements of ML programming”, Second Edition, Prentice Hall, 1998.
5. Richard A. O’Keefe, “The craft of Prolog”, MIT Press, 2009.
6. W. F. Clocksin and C. S. Mellish, “Programming in Prolog: Using the ISO Standard”, Fifth Edition, Springer, 2003.

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**

**M. Tech. (5 Years) VIII Semester  
IT-804B : Mobile and Wireless Computing**

**Objective:**

To learn and understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.

To learn and understand architecture of GSM and CDMA system. To understand mobile management, voice signal processing and coding in GSM and CDMA system. To understand mobile devices connectivity to Internet.

**Prerequisites:** Computer Networks

**Unit I**

Introduction: Overview of the emerging field of mobile computing; Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building communications systems, RF vs. IR.

Characteristic of Cellular Systems, Mobility support in cellular telephone networks, Mobile applications, Limitations, Health Concerns.

**Unit II**

Mobile communication: Fiber or wire based transmission, Wireless Transmission: Frequencies, Antennas and Signal Propagation – path loss of radio signals, Additional signal propagation effect, Multipath propagation, Spread Spectrum- DSSS and FHSS.

Modulation Techniques, Multiplexing techniques, Coding techniques, CDMA, Multiple Radio Access – Introduction Contention based protocols, Channel Allocation

**Unit III**

The Cellular Concept : Introduction, Cell Area, signal strength and cell parameters, capacity of a cell, Frequency reuse, Co-channel Interference, Cell splitting, Cell Sectoring.

Mobile Communication System : Introduction, Cellular System Infrastructure, Registration, Handoff support, Multicasting, Authentication & security, frequency hopping.

Introduction Contention based protocols, Channel Allocation. GSM- System architecture of GSM, protocols, localization and calling, handover, security. **Unit IV**

IEEE802.11: Protocol architecture, layers, Information bases and networking, Case Study on Wireless LAN infrastructure and Bluetooth.

Mobile IP, goals, assumptions requirements, entities & terminology, IP packet delivery, tunnelling and encapsulation, Feature & format IPv6, DHCP, TCP over Wireless.

**Unit V**

Characteristic of Ad Hoc networks, Applications, need for routing, routing classification, Wireless sensor networks, classification & Fundamental of MAC protocol for wireless sensor networks, Introduction to IOT

**Text Books:-**

1. Mobile Communications author Jochen Schiller, publication John Willy & Sons, Ltd.
2. Wireless And Mobile Systems author D P Agrawal & Qing-An zeng, publication Thomson.

**Reference Books:-**

1. Wireless Networks author P Nicopotidis, publication Addison –Wesley-An zeng publication
- 2: Mobile Computing author Dr. Rajkamal, publication Oxford University Press.

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**

**M. Tech. (5 Years) VIII Semester**

**IT-803B: Artificial Intelligence**

**Aim of Course:** To familiarize students with techniques of representing knowledge required to build intelligent machines capable of taking decision like human beings.

**Objectives:**

The course is designed to make students:

- To familiarize students with techniques of solving problems that need human intelligence.
- To enable students to formulate Artificial Intelligence problems
- To enable students to use heuristic techniques to solve the AI problem.

**Course Contents:**

**Unit-I**

**Introduction to AI & Problem Solving in AI:**

What is AI, AI Techniques, Defining the Problem in AI, Problem Spaces, Problem Characteristics, Production System and its Characteristics.

**Unit-II**

**Heuristic Search Techniques:** Heuristic Search, Criteria for Success, various search techniques-Generate and Test, Depth and Breadth First, Hill Climbing , Best first Search, A\* algorithm.

**Unit-III**

**Knowledge Representation and Issues:** Types of Knowledge, Representation and mapping, approaches and issues in knowledge representation, Predicate Logic- representation of simple facts, computable functions, resolution, logic programming, matching, control knowledge.

**Unit-IV**

**Prolog Programming:**

Introduction and applications, facts, objects and predicates, Linguistic variables, Rules, input-output operations, controlling execution: Recursion, fail; Arithmetic operations, List, dynamic databases; expert system design.

**Unit-V**

**Knowledge Representation Techniques and Advanced AI:** Slot and filler structure – introduction, weak and strong structure, semantic nets, frames, conceptual dependency and Frames; fuzzy logic and robotics, Expert system-concept and design.

**Reference Books:-**

1. Artificial Intelligence: Elaine Rich and Kevin Knight (TMH publication)
2. Introduction to AI and expert systems: D.W. Patterson (PHI publication)
3. Essential References: Artificial Intelligence: Petric Henry Winston (Addison-Wesley)
4. N.J.Nilson: Principles of Artificial Intelligence, Narosa Publications.
5. Introduction to Turbo Prolog: Carl Townsend(BPB publication)

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**  
**M. Tech. (IT) 5 Years VIII SEMESTER**  
**IT-802A: Software Engineering**

**Aim of Course:** To gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

**Objectives:**

The course is designed to make students:

- Understand the various activities undertaken for a software development project.
- Develop and write a software project proposal
- Develop and write a Software Requirements Specification and design document.
- Learn to work within a team and understand team dynamics
- Be able to effectively communicate the work (Presentation skills)

**Course Contents:**

**UNIT I**

Introduction to Software Engineering: Software problem, Software engineering problem, Software engineering approach, Software characteristics and Applications.

Software Processes: Software processes and its components, characteristics of software processes, Software development processes: Linear Sequential model, Prototyping model, RAD model, Iterative Enhancement model, Spiral model, Component based development, Comparative study of various development models

**UNIT II**

Project management process: The people, product, process and project, Phases of project management process, the W5HH principle. Software configuration management process, Process management process: Capability Maturity Model (CMM).

**UNIT III**

Software Requirement Analysis and Specification: Software requirements, Problem analysis, Requirements specifications, Validation and Verification, Metrics.

Project Planning: Project estimation (Size & Cost), Project Scheduling, Staffing and personnel planning, Software configuration management plans, Quality assurance plans, Project monitoring plans, Risk management.

**UNIT IV**

Software Design: Design principles: Problem partitioning and hierarchy, Abstraction, Modularity, Top-down and Bottom-up strategies. Effective Modular design: functional independency, Cohesion, Coupling. Structured design methodology.

**UNIT V**

Software Quality Assurance: Quality concept, Quality management system, movements and assurance, Software reviews: formal and technical, Formal approaches to SQA, Statistical software quality assurance, Software reliability, ISO 9000, SQA plan.

Software Testing: Software testing techniques: Testing fundamentals, White box testing, Black box testing, testing for specialized environments, architectures and applications. Software testing strategies: A strategic approach to software testing, Strategic issues, Unit testing, Integration testing, Validation testing and system testing, the art of debugging

**Reference Books:**

1. Ian Sommerville, Software engineering, Ninth edition Pearson.
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House.
3. R. S. Pressman, Software Engineering-A practitioner's approach, Tata McGraw-Hill International Editions, New York.
4. Richard E. Fairly, Software Engineering Concepts, Tata McGraw Hill Inc. New York.
5. W. S. Jawadekar, Software Engineering: Principle & Practice, Tata McGraw-Hill, New York
6. Rajib Mall, Fundamentals of Software Engineering, PHI, New Delhi.

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**  
**M. Tech. (IT) 5 Years VIII SEMESTER**  
**IT-805A: Cloud Computing**

**Aim of Course:** To enable the students to have a thorough understanding of the activities associated to Cloud computing, its architecture, virtualization technology etc.

**Course Contents:**

**Unit-I**

**Introduction:** Historical development , Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments .Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking .

**Unit-II**

**Cloud Computing Architecture:** Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

**Unit –III**

**Cloud Management & Virtualization Technology:** Resiliency, Provisioning, Asset management, Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

**Unit-IV**

**Cloud Security:** Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture .

**Unit-V**

Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition , Cloud Federation Stack , Third Party Cloud Services .

Case study : Google App Engine

**Recommended Text:**

1. Buyya, Selvi ,” Mastering Cloud Computing “,TMH Pub
2. Kumar Saurabh, “Cloud Computing” , Wiley Pub
3. Krutz , Vines, “Cloud Security “ , Wiley Pub
4. Velte, “Cloud Computing- A Practical Approach” ,TMH Pub
5. Sosinsky, “ Cloud Computing” , Wiley Pub

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**

**M. Tech. (IT) 5 Years VII SEMESTER**

**IT-808: Bio-Informatics**

**Aim of Course:** This course provides an introduction to the analysis of biological data using computational methods, as well as investigating problems in molecular and biology from a computational perspective.

**Objectives:**

The course is designed to make students:

- Develop an understanding of the basic principles of molecular and cell biology.
- Become familiar with existing tools and resources for computational analysis of biological data, including sequences, phylogenies, microarrays, ontologies, and bio-molecular interactions.
- 4. Understand basic abstractions and computational approaches used for analysis including data warehouses, data mining, programming languages.

**Course Contents:**

**UNIT I**

What is bioinformatics? Definitions and concepts, Objectives/goals of Bioinformatics, Importance of Bioinformatics , Genome projects, DNA, RNA, DNA fingerprinting , types of RNA, functions of mRNA, tRNA, and rRNA, Amino Acids, Proteins, Central Dogma of Molecular Biology, Gene Coding, & Expression , Genetic disorder , cloning.

**UNIT II**

Molecular Biology, RNA, DNA , Protein structure, DNA Sequencing, Base Pairs, Mutations and its type, Sequence Alignment, Dot plots, Simple Alignment. Scoring Matrices. Algorithms Pair wise sequence alignment - NEEDLEMAN and Wunsch, Smith Waterman algorithms; Multiple sequence alignments - CLUSTAL, PRAS; Patterns, motifs and Profiles in sequences.

**UNIT III**

Biological Databanks, Data Mining, Data warehousing, data capture, data analysis; Introduction to Nucleic Acid and Protein Sequence Data banks; Nucleic acid sequence data banks: Genbank, EMBL nucleotide sequence data bank, Protein sequence data banks: NBRF-PIR, SWISSPROT, Signal peptide data bank; Database Similarity Searches: BLAST, FASTA, PSI-BLAST algorithms.

**UNIT IV**

Programming Languages, Programming in C: Pointers, pointers to functions, macro and programming in C, graphs, data structure– linked list, stack, queue, binary trees, threaded binary trees, File and exception handling in C. PERL: Strings, Numbers, and Variables. Variable Interpolation, Basic Input and Output, File handles, Making Decisions, Conditional Blocks, Loops, Combining Loops with Input, Standard Input and Output, Finding the Length of a Sequence File, Pattern Matching, Extracting Patterns, Arrays, Arrays and Lists, Split and Join, Hashes, A Real-World Example, BioPERL; Applications.

**UNIT V**

Bioinformatics medicine, Preventative medicine , Gene therapy , Drug development | Alternative energy sources, personalized medicine, crop improvement, forensics analysis, Biotechnology etc. Machine learning overview, Neural networks, , Phylogenetic trees

**Reference Books:**

1. Pierre Baldi and Søren Brunak, Bioinformatics, The Machine Learning Approach, second edition, MIT Press, Cambridge, MA, 2001.
2. Dan E. Krane, Michael L. Raymer , Fundamental Concepts of Bioinformatics.
3. James Tisdall, Beginning Perl for Bioinformatics.
4. Cynthia Gibas, Per Jambeck , Developing Bioinformatics Computer Skills.
5. Arthur M. Lesk , Database Annotation in Molecular Biology: Principles and Practice.

**International Institute of Professional Studies,  
Devi Ahilya University, Indore.  
Master of Technology(IT) 5 years VIII semester  
IT-809:Image Processing**

**UNIT I DIGITAL IMAGE FUNDAMENTALS**

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models

**UNIT II IMAGE ENHANCEMENT**

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters

**UNIT III IMAGE RESTORATION AND SEGMENTATION**

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation

**UNIT IV WAVELETS AND IMAGE COMPRESSION**

Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards

**UNIT V IMAGE REPRESENTATION AND RECOGNITION**

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors –Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

**Text books:**

- 1.Digital Image Processing and Computer Vision, Sonka, lavac, Boyle, Cenage Learning.
- 2.Digital Image Processing, R.C. Gonzalez, R.R. Woods(TMh)
- 3.Digital Image Processing And Analysis, PHI, B. Chanda, D.Datta Mujumdar.

**References Books:**

1. Anil Jain, "Fundamentals Of Digital Image Processing", Anil Jain PHI, ISBN-81- 203-0929-4
2. Digital Image Processing using MATLAB, R.C. Gonzalez, R.R. Woods(Person), 2nd Edition.
3. Digital Image Processing, S.Jayaraman, T. Veerakumar ( Mc Graw Hill).
4. Introduction to Digital Image Processing with MATLAB, Alasdair McAndrew, Cenage Learning



**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**  
**M. Tech. (5 Years) VIII Semester**  
**IT-811A: Information Security**

**Course Objectives**

Objectives of this course are to gain understanding of principles and practices of computer system security including operating system security, network security, software security and web security.

**UNIT-1**

Internet Ethics, Browser Security, Downloads, e-Mail Security and guidelines for using e-mail safely, Malware, Mobile Security, Online Banking Risks, Online Scams, Password Threats

**UNIT-2**

Social Engineering, Desktop Security, Copyrights, Instant messengers, security risks, Data Security, Importance of securing data, Different methods of securing data, Identity theft, Online predators, Phishing and vishing scams, SPAM

**UNIT-3:**

Introduction to Cryptography: History of cryptography, Basic principles and theorem, Block and stream ciphers, Cryptographic Algorithms: DES, 3DES, RC-4, Twofish, Blowfish and AES, RSA, hash functions, Public and private key systems,

**UNIT -4:**

Approximate strength of ciphers, Authentication, Password system. Secure design principles (Least-privilege, fail-safe defaults, complete mediation, separation of privilege), TCB and security kernel construction, System defence against memory exploits Windows security.

**UNIT-5**

Data Security and Network security, Network Intrusion detection and prevention systems, Firewalls, User authentication, authentication-via- secret and session management, SQL Injection, Resource Protection models, Side channel attacks, Authentication models, Authentication methods, Trusted Computing, Legal and Ethical Issues

**References:**

1. W. Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, 2003.
2. Mann, Mitchell, Krell, "Linux System Security", 2nd Edition, Pearson Education, 2003.
3. Robert, C. Newman, "Enterprise Security", Pearson Education, 2003.
4. Kaufman, Perlman and Speciner, "Network Security, Private Communication in a Public Network", Prentice Hall of India, 2003.
5. Nortcutt & Judy Novak, "Network Intrusion Detection", 3rd Edition, Pearson Education, 2003.
6. Computer Security: Art and Science (2<sup>nd</sup> version)

**Web sites:**

1. [www.infosecuritymag.com](http://www.infosecuritymag.com)
2. [www.list.gmu.edu](http://www.list.gmu.edu)

**E-resources:**

1. [https://onlinecourses.nptel.ac.in/noc15\\_cs03/](https://onlinecourses.nptel.ac.in/noc15_cs03/)
2. [https://onlinecourses.nptel.ac.in/noc16\\_cs01/](https://onlinecourses.nptel.ac.in/noc16_cs01/)
3. [https://onlinecourses.nptel.ac.in/noc17\\_cs08/](https://onlinecourses.nptel.ac.in/noc17_cs08/)
4. [https://onlinecourses.nptel.ac.in/noc18\\_cs24/](https://onlinecourses.nptel.ac.in/noc18_cs24/)
5. <https://www.coursera.org/learn/information-security-data>

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE**  
**M. Tech. (5 Years) VIII Semester**  
**IT-812: Real time System**

**Course Contents**

Unit-1: Real Time Systems: Introduction to Real Time Systems, Classification of Real Time System, Concept of Computer Control, Types of Real Time Operating Systems.

Unit-2: Requirements for Real Time Systems: Human Computer Interaction in Real Time Systems, Hardware Requirement for Real time Systems, Specialized Processors, Interfaces & Communications.

Unit-3: Modeling Real-Time Systems: Purpose of the Model, Structural Elements, Interfaces, Event-Triggered versus Time-Triggered, Interrupts.

Unit-4: Real Time Languages: Overview of Real Time Languages, Few Real Time Languages, Modula 2 as Real Time Language, Ada as Real Time Language.

Unit-5: Real Time Operating Systems – 1: RTOS Overview, RTOS Components, Task Management & Memory Management, Scheduling Strategies, Commercial Real-time Operating Systems.

**Text Book:**

1. Phillips A Laptante-Real Time System: Design and Analysis, John Wiley-India Edition-2016.

**Reference Books:**

1. Rajib Mall- Real time Systems: Theory and Practice Pearson Edition.

2. J.W.S. Lui Real time Systems Pearson Education, New Delhi.