

**INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE**

MCA (6 Years)

IX SEMESTER



Jul. 2017 – Dec. 2017

Sub. Code	Sub. Name	Credit
IC-905A	Object Oriented Analysis and Design	4
IC-901A	Compiler Design	4
IC-914	Network & Information Security	4
IC-912	Artificial Intelligence	4
IC-913	Bio Informatics	4
IC-907C	Project	4
IC-912A	Artificial Intelligence Lab	2
IC-906	Comprehensive Viva	4
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IC-905A: Object Oriented Analysis and Design

Aim of Course: To enable the students to have a thorough understanding of the activities associated to develop projects. And establish the flow of events by making a planning that how software can be shown in its entirety prior to its implementation using Object Oriented Analysis and Design techniques.

Objectives:

The course is designed to make students:

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.
- Develop an understanding of the application of OOAD practices from a software project management perspective

Course Contents:

UNIT I

Object oriented analysis and its design. Software engineering best practices. UML: its road map. Root causes of software failure and symptoms of software failure.

UNIT II

Introduction to the Rational Unified process: Workflow and Lifecycle. Introduction to Object Orientations: problem definition, modeling, using UML modeling mechanisms and there representation.

UNIT III

Requirements Management: key concepts, problem statement, Glossary, use- case model, supplementary specification, functional and nonfunctional requirements.

UNIT IV

Analysis and design overview: architectural analysis-layers. Use case Analysis- Responsibilities, attributes and association, Architectural design.

UNIT V

Describe concurrency, Describe distribution, Use- case design, Subsystem Design, Class design, package.

Reference Books:

1. P.Kruchen, The Rational Unified Process: An Introduction, Pearson EducationAsia, 2000.
2. G. Booch. I. Jacobson, J. Rumbaugh, The Unified Modeling Language- User's Guide, Addison Wesley, 1999.
3. W.Boggs and M. Boggs, Mastering UML with Rational Rose, BPB Publications, 1999.
4. G. Booch, Object oriented Analysis and Design with Applications, Addison Wesley, 1994.
5. M.Blaha, J. Rumbaugh, Object oriented modeling and design with UML, Pearson education 2nd edition, 2007.

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IC-901A: Compiler Design

Aim of Course: The course aims at understanding the working of compiler in detail so as to have knowledge of whole spectrum of language processing technology.

Objectives:

The course is designed to make students:

- Understand various phases of compilers theoretically as well as practically so as to have the actually feeling of its working.
- Understand some aspects of computation should be covered in course as parsing is of the most important issue in compiler.
- Learn the concepts of symbol table management, syntax-Directed definition and translations along with the code optimization and generation and error handling have to cover to complete the aim.

Course Contents:

UNIT I

Translators, Interpreters, assemblers, Compilers, Types of Compilers, Model of a compiler. Analysis of source program, Phases of a compiler, Cousins of the compilers.

UNIT II

Finite automata, non-deterministic and deterministic finite automata, Acceptance of strings by N DFA and DFA, Transforming N DFA to DFA, minimization/optimization of a DFA, related algorithm. Regular sets and regular expression. Obtaining regular expression from finite automata.

Lexical analyzer design, The role of Lexical Analyzer, Input Buffering, Specification of tokens, and Recognition of tokens.

UNIT III

Syntax analysis, CFG, derivation of a parse tree, elimination of left recursion Regular grammar, Right linear and left linear grammar. Parsing, Top-Down and Bottom Up parsing, general parsing strategies.

Top-down Parsing techniques: Brute-force approach, recursive descent parser and algorithms, Simple LL (1) grammar, LL (1) with null and without null rules grammars, predictive parsing.

Bottom-up parsing- Handle of a right sentential form, Shift-reduce parsers, operator precedence parsing, LR parsing.

UNIT IV

Symbol table contents Organization for block structured languages-stack symbols tables. Stack implemented hash structured symbol tables. Symbol table organization for Object Oriented Programming Languages.

Intermediates code generation, translation schemes for programming language constructs.

Code Optimization: - Definition, Local code optimization techniques, Elimination of local and global common sub Expressions, loop optimization.

UNIT V

Code Generation: - Definition, machine model, simple code generation method. Peephole optimization.

Error Handling: - Error recovery, recovery from various phase and parsing.

Text Books:

1. Alfred V. Aho, Ravi Sethi, Jeffery D. Ullman, Compilers: Principles, Techniques, and Tools, Addison Wesley Longman.

Reference Books:

1. Holub ,Compiler Design in C ,PHI
2. Jean Paul Tremblay, Paul G. Sorenson , The Theory & Practice of Compiler Writing.
3. Barrett, Bates, Gustafson, Couch , Compiler Construction Theory & Practice.

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IC-912 : 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)

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IC-913: 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.
- 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.