

Course Title	PROGRAMMING WITH JAVA				
Course Code	16IS5DCJAV	Credits	6	L-T-P-S	3-0-1-2
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT 1

An overview of Java: Object-oriented programming, Variables, Arrays, Introducing classes: Class fundamentals, Declaring objects, Assigning object reference variables, Introducing methods, Constructors, this keyword, finalize() method, A Stack class.

A closer look at methods and classes: Overloading methods, Objects as parameters, A closer look at argument passing, Returning objects, Recursion, Introducing access control, Understanding static, final, Arrays revisited, Nested and inner classes, String class, Command-line arguments, Varargs: Variable length arguments. 8 Hrs

UNIT 2

Inheritance: Basics, super, Multilevel hierarchy, Why constructors are executed, Method overriding, Dynamic method dispatch, Abstract classes, Using final with inheritance, Object class.

Packages and Interfaces: Packages, Access protection, Importing packages, Interfaces, Default interface methods, Use static methods in an interface. 9 Hrs

UNIT 3

Exception Handling: Fundamentals, types, Uncaught exceptions, Try and catch blocks, throw, throws and finally, Built-in exceptions, Creating own exceptions.

Multithreaded programming: Java thread model, The main thread, Creating a thread and multiple threads, Using isAlive() and join(), Thread priorities, Synchronization, Interthread communication, Suspending, resuming and stopping threads, Obtaining a Thread's state. 8 Hrs

UNIT 4

Enumeration, Autoboxing, Annotations basics, I/O Basics, Reading console input, Writing console output, Printwriter class, Reading and writing files, closing a file.

Generics: Example, Generic Class with two type parameters, Bounded types, Creating a Generic method and interfaces, Generic class hierarchies. 7 Hrs

UNIT 5

Applets: Applet fundamentals, Applet class, Applet architecture, An applet skeleton, Simple applet display methods, Requesting repainting, A simple banner applet, Passing parameters, `getDocumentBase()` and `getCodeBase()`, `AppletContext` and `showDocument`. 7 Hrs

Text Book

1. Java - The Complete Reference (JDK 8) by Herbert Schildt, 9th edition, Tata McGraw Hill, Edition 2014.

Reference Books

1. Java 8 Programming, Black book, Dreamtech Press, 2015.
2. Java 8 in Action, Raoul-Gabriel Urma, Mario Fusco and Alan Mycroft, Dreamtech Press, 2016.

E-Books

1. [http://www2.sunysuffolk.edu/tangy/cst112%5CText_book\(10th_ed\).pdf](http://www2.sunysuffolk.edu/tangy/cst112%5CText_book(10th_ed).pdf)
2. <http://file.allitebooks.com/20151026/Starting%20Out%20with%20Java,%206th%20Edition.pdf>

MOOCS

1. <https://www.udemy.com/java-tutorial/>
2. <https://www.udacity.com/course/intro-to-java-programming--cs046>

COURSE OUTCOME (COs)

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

CO1	Comprehend the concepts of encapsulation, polymorphism and inheritance.
CO2	Analyze the need for exception handling and multithreading.
CO3	Demonstrate the applications of file, generics and applets.
CO4	Apply object oriented concepts to solve problems.
CO5	Design and develop solutions for applications using appropriate object oriented concepts.

Course Title	DATABASE MANAGEMENT SYSTEMS				
Course Code	16IS5DCDBM	Credits	6	L-T-P-S	3-0-1-2
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT – 1

Introduction; An example; Characteristics of Database approach; Actors on the scene; Workers behind the scene; Advantages of using DBMS approach; When not to use DBMS; Data models, schemas and instances; Three schema architecture and data independence; Database languages and Interfaces, Database System environment, Centralized and Client/Server architectures for DBMSs, Classification of Database management systems. 6 Hrs

UNIT – 2

Entity-Relationship model: Using High-Level conceptual Data Models for database Design; A sample Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; ER Diagrams, Naming Conventions and Design issues; Relational Database Design Using ER-to-Relational mapping. 9 Hrs

UNIT – 3

Relational Model Concepts; Relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations.

SQL data definition and data types, Specifying constraints in SQL, Basic retrieval queries in SQL; Insert, Delete and Update statements in SQL; More complex SQL retrieval queries, Views (Virtual Tables) in SQL; Schema change statements in SQL. 9 Hrs

UNIT – 4

Relational Algebra: Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra. 7 Hrs

UNIT – 5

Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal form, Multivalued Dependency and Fourth Normal Form.

Transaction Management: Transaction concept, A simple transaction model, Transaction Atomicity and Durability; Transaction Isolation, Serializability. 8 Hrs

Text Books

1. Fundamental of Database Systems by Elmasri and Navathe, 6th Edition, Addison- Wesley, 2011.
2. Database System Concepts by Silberschatz, Korth and Sudharshan, 6th Edition, McGrawHill, 2015.

Reference Books

1. Database Systems: The Complete Book, Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, Second edition, Pearson, 2013.
2. Database Management Systems-A Conceptual Approach, Seema Kedar, Technical Publications, 2014.

E-Books

1. Database Design - 2nd Edition, Adrienne Watt and Nelson Eng.
2. Database Management Systems- 2013
http://www.lincoste.com/ebooks/english/pdf/computers/database_management_systems.pdf.

MOOCs

1. <https://www.coursera.org/learn/database-management>
2. <https://lagunita.stanford.edu/courses/DB/2014/SelfPaced/about>

COURSE OUTCOME (COs)

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

CO1	Understand the basic concepts of Database Management System.
CO2	Design ER-Diagram for real world applications using database concepts.
CO3	Implement SQL queries using relational model concepts.
CO4	Formulate relational algebraic expressions using relational model concepts.
CO5	Apply normalization concept for relational schema and comprehend the transaction processing.

Course Title	DATA COMMUNICATION AND NETWORKING				
Course Code	16IS5DCDCN	Credits	5	L-T-P-S	3-1-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	7	Total Lecture Hours	39		

UNIT 1

Network Model: Protocol Layering, TCP/IP Protocol suite, The OSI Model, Layers in the OSI Model. Introduction to physical layer: Data and Signals. **Digital Transmission:** Digital-to-Digital conversion, Analog to digital conversion, Transmission modes. 7 Hrs

UNIT 2

Data Link Layer: Design issues, Error and correction, Elementary data link protocols, Sliding window protocols. 7 Hrs

UNIT 3

Medium access control sublayer: Channel allocation problem, Multiple access protocols. **Wireless LAN:** 802.11- architecture, Protocol stack, MAC sublayer protocol, frame structure. 802.16- architecture, protocol stack, MAC sublayer protocol, frame structure, Comparison with 802.11 and 3G. 7Hrs

UNIT 4

Network layer: Design issues, Routing algorithms: Optimality principle, shortest path algorithm, flooding, Distance vector routing, Link state routing, Hierarchical routing, Broadcast routing, Multicast routing, Anycast routing, **Congestion control algorithms:** Approaches of congestion control, Quality of Service. 9Hrs

UNIT 5

Internetworking: Tunneling, Internetwork routing, Packet fragmentation. **The Network layer in the Internet:** IP version 4, IP addresses, IP version 6, Internet control protocols, Label switching and MPLS, OSPF, BGP, Internet multicasting, Mobile IP. 9 Hrs

Text Books

1. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition, 2013.
2. Computer Networks, Andrew S Tannenbaum and David J Wetherall, Pearson, 5th edition, 2014.

Reference Books

1. Computer Network – Protocol, Standards and Interface, Uyles Black, Second edition, Pearson, 2015.
2. Computer and Communication Networks, Nader F Mir, Pearson, 2015.
3. Computer Networking-A Top-Down approach, James F Kurose, Keith W Ross, 5th edition, Pearson, 2016.

E-Books

1. <http://www.e-booksdirectory.com/details.php?ebook=3502>
2. <http://www.freetechbooks.com/data-communication-and-networks-f31.html>

MOOCs

1. <http://nptel.ac.in/courses/106105082/>
2. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-263j-data-communication-networks-fall-2002/>

COURSE OUTCOME (COs)

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

CO1	Acquire knowledge about the various principles of communication.
CO2	Analyse the protocols used in Data link layer and MAC layer and design wireless LAN.
CO3	Design network using internetworking concepts and related protocol.

Course Title	WEB PROGRAMMING				
Course Code	15IS5DCWEP	Credits	4	L-T-P-S	3-0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT 1

XHTML, CSS and XML : Basic text markup; Images; Hypertext Links; Lists; Tables; Forms; HTML5 elements, Cascading Style Sheets: Style specification formats; Selector forms; Property value forms; Font properties; List properties; Alignment of text; Color, The Box model; Background images; span and div tags 7 Hrs

UNIT 2

JAVASCRIPT: Basics, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Functions, Data and objects in Javascript, Regular expressions, Exception handling, Built-in objects, Cookies, Events. 8 Hrs

UNIT 3

Dynamic HTML with JavaScript – Data validation, Opening a new window, Messages and confirmations, status bar, Writing to a different frame, Rollover buttons, Moving images, Floating logos. 8 Hrs

UNIT 4

An Introduction to PHP – PHP, Introducing PHP, Including PhP in a page, Data types, Program control, Arrays, User-defined functions, Built-in functions, Regular expressions, Using files, 7 Hrs

UNIT 5

XML: Introduction, The syntax of XML, XML Document structure, Document Type Definition, Namespaces, XML Schema, XSLT style sheets. 9Hrs

Text Books

1. Programming the World Wide Web by Robert W. Sebesta, 7th Edition, Pearson Education, 2014.
2. Web Programming Building Internet Applications by Chris Bates, 3rd Edition, Wiley India, 2015.

Reference Books

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Kogent Learning Solutions Inc., Dreamtech Press, 2014.
2. Java Script, The Complete Reference, Third edition, Thomas A Powell, Fritz Schneider, McGraw Hill Education, 2013.
3. JavaScript, The Definitive Guide, David Flanagan, Sixth edition, Orielly, 2013.

E-Books

1. Build your own website the right way using HTML and CSS, 3rd edition.
2. Beginning PHP6, Apache, and MySQL Web development. Timothy Boronczyk et. al.

MOOCs

1. <https://www.mooc-list.com/course/web-development-udacity?static=true>
2. <https://www.mooc-list.com/course/javascript-basics-udacity?static=true>
3. <https://www.mooc-list.com/course/intro-html-and-css-udacity?static=true>

COURSE OUTCOME (COs)

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

CO1	Able to use basic HTML tags and design Cascading Style Sheets.
CO2	Create network-centric applications and provide interactivity to websites using Dynamic HTML.
CO3	Design web pages for interaction with usage of HTML tags.
CO4	Create dynamic content to interact with the database.
CO5	Design user's topic specific markup language.

Course Title	INTERNET OF THINGS				
Course Code	16IS5DEIOT	Credits	4	L-T-P-S	3-0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT – 1

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT- IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies- Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, Domain Specific IoTs-Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle 7 Hours

UNIT - 2

M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations 8 Hours

UNIT – 3

M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management 7 Hours

UNIT –4

IoT Architecture-State of the Art – Introduction, State of the art Architecture
Reference Model- Introduction, Reference Model and architecture, IoT reference Model

8 Hours

UNIT – 5

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

9 Hours

Text books

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.

Reference Books

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
2. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012.

E-Books

1. <http://file.ebook777.com/001/Internet%20of%20Things%20with%20Arduino%20-%20Marco%20Schwartz.pdf>
2. https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwiH6JmGmPDNAhUBN48KHbFVAZgQFggoMAE&url=http%3A%2F%2Fwww.internet-of-things-research.eu%2Fpdf%2FIoT-From%2520Research%2520and%2520Innovation%2520to%2520Market%2520Deployment_IE_RC_Cluster_eBook_978-87-93102-95-8_P.pdf&usq=AFQjCNGNt_FiVeKddeCNvi4jlhuggnGyXQ&sig2=koYxFemjzrPQrkBv_H1sfw
3. <http://www.zdnet.com/article/the-executives-guide-to-the-internet-of-things-free-ebook/>

MOOCs

1. <https://www.coursera.org/specializations/iot>
2. http://web.mit.edu/professional/digital-programs/courses/IoT/index.html?utm_source=pe-twitter&utm_medium=social&utm_campaign=dp-2016

COURSE OUTCOME (COs)

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

CO1	Obtain an overview of IoT applications.
CO2	Comprehend the architecture, design principles and standards of IoT.
CO3	Understand M2M and IoT technology fundamentals.
CO4	Explain IoT reference model and architecture for real-world design constraints.

Course Title	DATA MINING				
Course Code	16IS5DEDMG	Credits	4	L-T-P-S	3-0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT-1

Data: Types of data, data quality, data preprocessing, Measures of similarity and dissimilarity, OLAP and multidimensional data analysis. 7 hrs

UNIT -2

Classification: Preliminaries, general approach to solving classification problem, decision tree induction, Rule based classifiers, Nearest neighbor classifiers, Bayesian classifiers. 8 Hrs

UNIT -3

Association analysis: Problem definition, frequent itemset generation, rule generation, compact representation of frequent itemsets, alternative methods for generating frequent itemsets, FP-Growth algorithm. 7 Hrs

UNIT-4

Cluster analysis: Overview, K-means, Agglomerative hierarchical clustering, DBSCAN, Cluster evaluation. 10 Hrs

UNIT- 5

Characteristics of data, clusters and clustering algorithms, density based clustering, graph based clustering, scalable clustering algorithms. 7Hrs

Text Book

1. Introduction to Data Mining, Pang-Ning Tan, Micheal Steinbach and Vipin Kumar, Pearson, 2015.

Reference Books

1. Data Mining and Predictive Analytics, Daniel T. Larose and Chantal D. Larose, Wiley publications, 2015.
2. Data Mining: The Textbook, Charu C. Aggarwal, Springer, 2015.

E-Books

1. <http://www.cs.rpi.edu/~zaki/PaperDir/DMABOOK.pdf>
2. [http://www.cse.hcmut.edu.vn/~chauvtn/data_mining/Texts/\[1\]%20Data%20Mining%20-%20Concepts%20and%20Techniques%20\(3rd%20Ed\).pdf](http://www.cse.hcmut.edu.vn/~chauvtn/data_mining/Texts/[1]%20Data%20Mining%20-%20Concepts%20and%20Techniques%20(3rd%20Ed).pdf)

MOOCs

1. <https://weka.waikato.ac.nz/dataminingwithweka/preview>
2. https://www.coursera.org/learn/data-patterns?siteID=.GqSdLGGurk-Ur_KLK5tcBMCCRbxVYx13Q&utm_content=10&utm_medium=partners&utm_source=linkshare&utm_campaign=*GqSdLGGurk

COURSE OUTCOME (COs)

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

CO1	Understand the fundamentals of data processing and analysis.
CO2	Comprehend the general approach to solving classification problems using different classifiers.
CO3	Apply the concept of association with frequent itemsets.
CO4	Obtain knowledge on cluster analysis and clustering algorithms.

Course Title	PYTHON PROGRAMMING				
Course Code	16IS5DEPYP	Credits	4	L-T-P-S	3-0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT-1

Introduction to Python, Python Concepts, Dynamic vs. Static Types, Interpreted vs. Compiled, Prototyping, Procedural vs. Object-Oriented Programming, The Python Interpreter, Using the Python Command Prompt, Commenting Python, Launching Python programs, Integrated Development Environments, Types and Operators, Python Syntax , Indentation, Multiple Line Spanning, Python Object Types, Python Numbers.

Strings: Basic string operations, Indexing and slicing strings, String Formatting, Combining and Separating Strings, Regular Expressions

Lists: List usage, Adding List Elements, Mutability, Methods,

Dictionaries: Making a dictionary, Basic operations, Dictionary details, Operation

Tuples: Why Use Tuples? Sequence Unpacking, Methods. 9 Hrs

UNIT-2

Files: File Operations, Files and Streams, Creating a File, Reading From a File, Iterating Through Files, Seeking, Serialization.

Statements: Assignment, Expressions/Calls, Printing, if Tests, while Loops, for Loops, pass Statement, break and continue Statements .try, except, finally and raise Statements, import and from Statements, def and return Statements , Class Statements, Scope, Default Arguments.

Exceptions: Exception Class Hierarchy, User-Defined Exceptions. 7 Hrs

UNIT-3

Object Oriented Programming: Learning Python Classes, How Are Classes Better? , “New-style” classes, Inheritance, Operator Overloads, Class Methods.

Databases: How to Use a Database, Working With a Database , Using SQL to Query a Database, Python and SQLite, Creating an SQLite DB, Pulling Data from a DB, SQLite Database Files, Distributing Your Program. 7 Hrs

UNIT-4

System tools: The os.path to knowledge, System scripting overview, introducing the sys module, introducing the os module, Script execution context: Current working directory, command-line arguments, Shell environment variables.

9 Hrs

UNIT-5

File tools, directory tools, Parallel system tools: Forking processes, Threads, Program exits.

7 Hrs

Text Book

1. Learning to Program using Python by Cody Jackson, Second Edition, 2014.
2. Programming Python, Mark Lutz, O'reilly Media, 2015.

Reference Books

1. Introducing Python by Bill Lubanovic, O'Reilly Media, Edition 2014.
2. Python Essential Reference, 4th Edition by David M. Beazley, Pearson Education, Inc., Edition – 2009
3. Learning with Python: How to Think Like a Computer Scientist, Allen Downey, Jeffrey Elkner and Chris Meyers, Dreamtech Press, 2015.

E-Books

1. <http://www.onlineprogrammingbooks.com/learning-program-using-python/>
2. <http://www.greenteapress.com/thinkpython/thinkpython.pdf>

MOOCs

1. <https://www.coursera.org/learn/python>
2. <https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-8>
3. <https://www.class-central.com/mooc/4174/coursera-python-data-structures>

COURSE OUTCOME (COs)

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

CO1	Obtain knowledge on fundamentals of Python programming including Strings, Lists, Dictionaries and Tuples.
CO2	Develop programs using file operations, statements and exceptions.
CO3	Demonstrate the concepts of object oriented programming and databases.
CO4	Apply System tools and File tools for programming.

Course Title	ARTIFICIAL INTELLIGENCE				
Course Code	16IS5DEAIN	Credits	4	L-T-P-S	3-0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours	39		

UNIT-1

What is AI? , Intelligent agents: Agents and environments, Types of Agents, **Problem Solving:** Representation of problem in state-space, **Uniformed-search strategies:** Breadth-Frist Search, Depth-First Search, Uniform Cost Search, Depth Limited Search, Iterative Deepening search
7 Hrs.

UNIT-2

Informed Search Strategies: Heuristic Search, Greedy Search, A*, AO*, Means-End Analysis, Heuristic Functions, Hill Climbing Search, Crypt Arithmetic
10 Hrs.

UNIT-3

Knowledge & Reasoning: Knowledge-Based Agent, The UMPUS World Environment, Representation, Reasoning & Logic, Propositional Logic, First-Order Logic: Syntax & Semantics: Examples
7 Hrs.

UNIT-4

Predicate Logic: Forward and Backward Chaining, Resolution & Question and Answering: Representing knowledge using Rules, Procedural Vs Declarative Knowledge.
7 Hrs.

UNIT-5

Uncertain Knowledge & Reasoning: Handling Uncertain Knowledge, Prior Probabilities, Conditional Probabilities, Bayes Rules (Combining Evidences), Belief Network: Construction, Induction Learning, Learning from Decision Trees
8 Hrs.

Text Book

1. Artificial Intelligence - A Modern Approach, Stuart Russell and Peter Norvig, Third edition, Pearson, 2014.

Reference Books

1. Introduction to Artificial Intelligence and Expert Systems, Dan W Patterson, Pearson, 2015.
2. Artificial Intelligence, Elaine Rich, Kevin Knight and Shivashankar B Nair, Third edition, McGrawHill Education, 2015.

E-Books

1. <http://www.e-booksdirectory.com/details.php?ebook=9845>
2. [http://www.freebookcentre.net/ComputerScience-Books-Download/Artificial-Intelligence-II-\(David-Marshall\).html](http://www.freebookcentre.net/ComputerScience-Books-Download/Artificial-Intelligence-II-(David-Marshall).html)

MOOCs

1. <https://www.edx.org/course/artificial-intelligence-uc-berkeleyx-cs188-1x>
2. <https://www.udacity.com/course/intro-to-artificial-intelligence--cs271>
3. <https://www.class-central.com/subject/ai>

COURSE OUTCOME (COs)

The students will be able to:

CO1	Define AI, know about agent and its types and solve problems using uninformed and informed search strategies.
CO2	Apply knowledge and reasoning; use propositional logic, first-order logic and predicate logic for question and answering.
CO3	Differentiate between procedural and declarative knowledge, handle probabilities and learn from induction and decision trees.