

ST. XAVIER'S COLLEGE (AUTONOMOUS)

PALAYAMKOTTAI - 627 002

(Recognized as "College with Potential for Excellence" by UGC)
(Accredited by NAAC at "A++" Grade with a CGPA of 3.66 in IV Cycle)
(Star College Programme by DBT, Govt. of India.)
Affiliated to Manonmaniam Sundaranar University Tirunelveli

SYLLABUS



Preserve this copy of the syllabus until you complete the course, as it is an important document of your present course of study.

Name _____

BACHELOR OF SCIENCE

Choice Based Credit System (CBCS)

(w.e.f. June 2024-2025)

PROGRAMME NAME : ARTIFICIAL INTELLIGENCE

PROGRAMME CODE :

ARTIFICIAL INTELLIGENCE (B. Sc) – Programme Structure

| Sem | Part | Status | Sub. Code | Title of the Paper | Hrs | Cdt |
|-----|------|-----------------------|---|---|-----|-----|
| I | I | Lang | 24UGTL11 | General Tamil – I | | |
| | I | Lang | 24UGHL11 | Hindi – I | | |
| | I | Lang | 24UGFL11 | French – I | 6 | 3 |
| | II | Lang | 24UGEL11 | General English – I | 6 | 3 |
| | III | Core-T1 | 24UAIC11 | Programming with C++ | 4 | 5 |
| | III | Core-P1 | 24UAIC12 | Practical: Programming with C++ | 4 | 3 |
| | III | EC-T1 | 24UAIE11 | Discrete Mathematics / Microprocessor | 4 | 3 |
| | III | EC-P1 | 24UAIE12 | Introduction to HTML / Microprocessor | 2 | 2 |
| | IV | SEC1 | 24UAIN11 | Power BI (NME) | 2 | 2 |
| IV | FC | 24UHER11/ 24UHEE11 | Foundation Course: Religion: Catholic Doctrine / Ethics | 2 | 2 | |
| | | | | | 30 | 23 |
| II | I | Lang | 24UGTL21 | General Tamil – II | | |
| | I | Lang | 24UGHL21 | Hindi – II | | |
| | I | Lang | 24UGFL21 | French – II | 6 | 3 |
| | II | Lang | 24UGEL21 | General English – II | 6 | 3 |
| | III | Core-T2 | 24UAIC21 | Data Structures | 4 | 5 |
| | III | Core-P2 | 24UAIC22 | Practical: Data Structures using C++ | 4 | 3 |
| | III | EC-T2 | 24UAIE21 | Introduction to Statistics / Operation Research | 4 | 3 |
| | III | EC-P2 | 24UAIE22 | Practical: Statistics / Operation Research using C++ | 2 | 2 |
| | IV | SEC2 | 24UAIN21 | Fundamentals of Artificial Intelligence (NME) | 2 | 2 |
| IV | SEC3 | 24UHEI21 | Integrated Personality Development | 2 | 2 | |
| | | | | | 30 | 23 |
| III | I | Lang | 24UGTL31 | General Tamil – III | | |
| | I | Lang | 24UGHL31 | Hindi – III | | |
| | I | Lang | 24UGFL31 | French – III | 6 | 3 |
| | II | Lang | 24UGEL31 | General English – III | 6 | 3 |
| | III | Core-T3 | 24UAIC31 | Database Systems | 4 | 5 |
| | III | Core-P3 | 24UAIC32 | Practical: Oracle | 4 | 3 |
| | III | EC-T3 | 24UAIE31 | Data mining / GUI Based Programming | 4 | 3 |
| | III | EC-P3 | 24UAIE32 | Practical: R Programming / GUI Based Programming | 2 | 2 |
| | IV | SEC4 | 24UHEL31 | Life Issues & Entrepreneurial Skill Development | 2 | 2 |
| IV | SEC5 | 24UAIN31 | Introduction to Machine Learning (NME) | 2 | 2 | |
| | | | | | 30 | 23 |
| IV | I | Lang | 24UGTL41 | General Tamil – IV | | |
| | I | Lang | 24UGHL41 | Hindi – IV | | |
| | I | Lang | 24UGFL41 | French – IV | 6 | 3 |
| | II | Lang | 24UGEL41 | General English – IV | 6 | 3 |
| | III | Core-T4 | 24UAIC41 | JAVA Programming | 4 | 4 |
| | III | Core-P4 | 24UAIC42 | Practical: JAVA Programming | 3 | 3 |

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| | III | EC-T4 | 24UAIE41 | Operating and LINUX / Computer Graphics | 3 | 3 |
| | III | EC-P4 | 24UAIE42 | Practical: LINUX / Computer Graphics | 2 | 2 |
| | IV | SEC6 | 24UAIN41 | Desktop Publishing (NME) | 2 | 2 |
| | IV | SEC7 | 24UAIS41 | Software Engineering / Internet of Things | 2 | 2 |
| | IV | EVS | 24UEVS41 | Environmental Studies | 2 | 2 |
| | | | | | 30 | 24 |
| V | III | Core-T5 | 24UAIC51 | Python Programming for Machine Learning | 5 | 5 |
| | III | Core-T6 | 24UAIC52 | Machine Learning | 5 | 5 |
| | III | Core-P5 | 24UAIC53 | Practical: Python Programming for Machine Learning | 5 | 3 |
| | III | Core-P6 | 24UAIC54 | Practical: Machine Learning | 5 | 3 |
| | III | EC-T5 | 24UAIE51 | PHP Programming / J2EE | 4 | 3 |
| | III | EC-P5 | 24UAIE52 | Practical: PHP Programming / J2EE | 4 | 3 |
| | IV | VE | 24UVEH51 | Human Rights & Social Analysis | 2 | 2 |
| | IV | Internship | 24UCA56 | Internship | - | 2 |
| | | | | | 30 | 26 |
| VI | III | Core-T7 | 24UAIC61 | Neural Networks | 4 | 4 |
| | III | Core-T8 | 24UAIC62 | Cloud Computing | 4 | 4 |
| | III | Core-P7 | 24UAIC63 | Practical: Neural Networks | 4 | 2 |
| | III | Core-P8 | 24UAIC64 | Practical: Microsoft Azure | 4 | 2 |
| | III | Core | 24UAIC65 | Project with Viva Voce | 8 | 3 |
| | III | EC-T6 | 24UAIE61 | Computer Networks / Computer Vision and Robotics | 4 | 3 |
| | IV | SEC8 | 24UAIS61 | Professional Competency Skill | 2 | 2 |
| | V | Extension Activities | | STAND (Student Training and Action for Neighbourhood Development) | - | 1 |
| | | | | | 30 | 21 |
| | | | | | | |
| | | | | Additional Compulsory Courses | | |
| I UG | Add-on | 24UAIAO1 / 24UAIAO2 | Office Automation / Natural Language Processing | | | 2 |
| II UG | Value Added | | | | | |
| III UG | ECC (Any One) | 24UAIEC1 / 24UAIEC2 | Fundamentals of Computer / Introduction to Data Science | | | 2 |
| | | | | TOTAL | 180 | 140 |

OBJECT ORIENTED PROGRAMMING USING C++

(Course Code: 24UAIC11)

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|---------------------|------------------|------------------|--------------------|------------------------|
| SEMESTER – I | CORE – T1 | HOURS – 4 | CREDITS – 5 | TOTAL HOURS: 60 |
|---------------------|------------------|------------------|--------------------|------------------------|

COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. **(K1)**

CO2: Understand dynamic memory management techniques using pointers, constructors, destructors, etc. **(K2)**

CO3: Describe the concept of function overloading, operator overloading, virtual functions and polymorphism **(K3)**

CO4: Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming **(K4)**

CO5: To understand concept of Files **(K5)**

CO6: Demonstrate the use of various OOPs concepts with the help of programs **(K6)**

UNIT I INTRODUCTION (12 HOURS)

Basic concepts of Object-Oriented Programming – Benefits of OOP – Object Oriented Languages – Structure of C++ - Tokens – Keywords – Expression – Operators in C++ - I/O in C++ - C++ Declarations. **Control Structures:** - Decision Making and Statements: If...Else, jump, goto, break, continue, Switch case statements – **Loops in C++:** for, while, do-while.

UNIT II FUNCTION, CLASSES AND OBJECTS (12 HOURS)

Functions in C++ : Function Prototyping – Call by Value and Reference – Inline Functions - Default Arguments – Function Overloading. **Classes and Objects:** Declaring Objects – Defining Member Functions – Arrays within a class – Static Member variables and functions – array of objects – friend functions – Overloading member functions.

UNIT III CONSTRUCTORS AND OPERATOR OVERLOADING (12 HOURS)

Constructor and destructor: Parameterized Constructor - Multiple constructors in a class – constructors with default arguments – copy constructor – dynamic constructor – destructors. **Operator Overloading:** Overloading Unary Operators - Overloading Binary Operators – Overloading Binary Operators using Friend functions – type conversion.

UNIT IV INHERITANCE AND POINTERS (12 HOURS)

Inheritance: Defining derived classes - Types of Inheritance – Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid inheritance – Virtual base Classes – Abstract Classes. **Pointers** – Declaration – Pointer to Objects – this pointer – Pointers to derived classes – Polymorphism and Virtual Functions – Pure Virtual Function.

UNIT V FILES, TEMPLATES AND EXCEPTION HANDLING (12 HOURS)

Files: File stream classes – open and close a file - file modes – Sequential Read / Write operations – Random Access Operation – **Templates:** Class Templates - Class Templates with multiple parameters – Exception Handling: basics of Exception Handling - Try – Catch – Rethrowing an exception.

TEXT BOOK

E. Balagurusamy, “Object-Oriented Programming with C++”, 8th Edition, Tata McGraw Hill, 2019.

REFERENCE BOOKS

1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2. Maria Litvin & Gray Litvin, “C++ for you”, Vikas publication 2002.
3. Object-Oriented Programming Using C++ by Alok Kumar Jagadev , Amiya Kumar Rath , Satchidananda Dehuri , PHI Learning, 2017

WEB RESOURCES

- <https://alison.com/course/introduction-to-c-plus-plus-programming>
- <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>
- https://www.w3schools.com/cpp/cpp_oop.asp

PRACTICAL: C++ PROGRAMMING

(Course Code: 24UAIC12)

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|---------------------|------------------|------------------|--------------------|------------------------|
| SEMESTER – I | CORE – P1 | HOURS – 4 | CREDITS – 3 | TOTAL HOURS: 60 |
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LIST OF PROGRAMS

1. Write a C++ program to demonstrate Class and Objects
2. Write a C++ program to demonstrate conditional statements.
3. Write a C++ program to demonstrate looping statements.
4. Write a C++ program to demonstrate user defined function.
5. Write a C++ program to demonstrate function overloading
6. Write a C++ program to demonstrate Constructor
7. Write a C++ program to demonstrate Operator Overloading
8. Write a C++ program to demonstrate:
 - A. Single Inheritance
 - B. Multilevel Inheritance
 - C. Multiple Inheritance
 - D. Hierarchical Inheritance
 - E. Hybrid Inheritance
9. Write a C++ program to demonstrate Virtual Functions.
10. Write a C++ program to manipulate a Text File.
11. Write a C++ Program using templates.
12. Write a C++ program to demonstrate Exception Handling.

DISCRETE MATHEMATICS
(Course Code: 23UAIE11)

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| SEMESTER – I | EC – T1 | HOURS – 4 | CREDITS – 3 | TOTAL HOURS: 60 |
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COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Describe the relations and functions and be able to determine their Properties. (K1)

CO2: Illustrate the basic principles of sets and operations in sets. (K2)

CO3: Solve basic set equalities. (K3)

CO4: Classify the counting principles to determine probabilities. (K4)

CO5: Determine if the argument is valid or not valid. (K5)

CO6: Formulate and solve real world problems using graphs and trees. (K6)

UNIT I SET THEORY AND RELATION (12 HOURS)

SET THEORY: Introduction – Sets and Elements – Universal Set and Empty Set – Subsets – Venn Diagrams – Set Operations – Algebra of Sets and Duality – Finite Sets, Counting Principle – Class of Sets, Power Sets and Partitions. **RELATIONS:** Introduction – Product Sets – Relations – Pictorial Representations Of Relations – Composition of Relations – Types of Relations – Closure Properties – Equivalence Relations – Partial Ordering Relations – n-ary Relations.

UNIT II FUNCTIONS (12 HOURS)

Introduction – Functions – One-to-One-Onto and Inevitable Functions – Mathematical Functions, Exponential and Logarithmic Functions – Sequences, Indexed Classes of sets – Recursively Defined Functions – Cardinality

UNIT III LOGIC AND PROPOSITIONAL CALCULUS (12 HOURS)

Introduction – Propositions and Compound Propositions – Basic Logical Operations – Propositions and Truth Tables – Tautologies and Contradictions – Logical Equivalences – Algebra of Propositions – Conditional and Bi-conditional Statements – Arguments – Logical Implication – Propositional Functions, Quantifiers – Negation.

UNIT IV COUNTING (12 HOURS)

Introduction, Basic Counting Principles – Factorial Notation – Binomial Coefficients – Permutations – Combinations – The Pigeonhole Principle – The Inclusion – Exclusion Principle

UNIT V GRAPH THEORY (12 HOURS)

Graphs – Complete, Regular and Bipartite Graphs – Labeled and Weighted Graphs – Subgraphs – Paths, Connectivity – The Bridges of Konigsberg, traversable Multigraphs – Tree Graphs – Planar Graphs – Spanning Tree – Minimal Spanning Tree – Euler’s Formula

TEXT BOOK

Seymour Lipschutz, Marc Lipson, "Discrete Mathematics", Second Edition, Tata McGraw Hill, 2019. Chapters : **1, 2, 3, 4, 5, 8.1-8.10**

REFERENCE BOOKS

1. B.S. Vatsa, "Discrete Mathematics", Third Edition, Wishwa Prakashan, 2018.
2. K.D. Joshi, "Foundation of Discrete Mathematics", Wiley Eastern Ltd., 2019.

WEB RESOURCES

1. <https://discrete.openmathbooks.org/dmoi3.html>
2. https://www.academia.edu/22551485/Seymour_Lipschutz_Marc_Lipson_Schaums_Outline_of_Discrete_Mathematics_McGraw_Hill_Osborne_Media_2007_

MICROPROCESSOR
(Course Code: 23UAIE11)

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|---------------------|--------------|------------------|--------------------|------------------------|
| SEMESTER - I | EC-T1 | HOURS - 4 | CREDITS - 3 | TOTAL HOURS: 60 |
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COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Remember the Basic binary codes and their conversions. **(K1)**

CO2: Understanding the 8085 instruction set and their classifications. **(K2)**

CO3: Applying different types of instructions to convert binary codes. **(K3)**

CO4: Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller. **(K4)**

CO5: Compare and understand the Microprocessor . **(K5)**

CO6: Implement and execute Interrupts in 8259 . **(K6)**

UNIT I NUMBER SYSTEM AND GATE NETWORKS (12 HOURS)

Number Systems: Binary Addition and Subtraction – Binary Multiplication and Division – Converting Decimal Numbers to Binary – Negative Numbers – Use of Complements to represent Negative Numbers – BCD Number Representation – Octal and Hexadecimal Number System **Boolean Algebra and Gate Networks:** Fundamental concepts of Boolean Algebra – AND and OR Gates – Complementation and Inverters – Evaluation of Logical Expressions – Basic Laws of Boolean Algebra.

UNIT II INTRODUCTION TO DIGITAL COMPUTERS (12 HOURS)

Digital Computers - Micro computer Organization-Computer languages –Microprocessor Architecture and its operations – Microprocessor initiated operations and 8085 Bus organization – Internal Data operations and 8085 registers - Peripheral or External initiated operations.

UNIT III 8085 MICROPROCESSOR (12 HOURS)

8085 Microprocessor – Pinout and Signals – Functional block diagram 8085 Instruction Set and Classifications.

UNIT IV BCD (12 HOURS)

BCD to Binary and Binary to BCD conversions - ASCII to BCD and BCD to ASCII conversions - Binary to ASCII and ASCII to Binary conversions. BCD Arithmetic-BCD addition and Subtraction – Multi byte Addition and Subtraction – Multiplication and Division.

UNIT V RIM AND SIM (12 HOURS)

The 8085 Interrupts – RIM AND SIM instructions – 8259 Programmable Interrupt Controller-Direct Memory Access (DMA) and 8257 DMA controller.

TEXT BOOKS

1. R.S.Gaonkar-"Microprocessor Architecture-Programming and Applications with 8085" - 5th Edition – Penram International Publications, 2009.[For unit I to unit IV]
2. Soumitra Kumar Mandal – Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051, Tata McGraw Hill Education Private Limited.[for unit V].

REFERENCE BOOKS

1. Mathur –Introduction to Microprocessor - 3rd Edition-Tata McGraw - Hill-1993.
2. RajKamal – Microcontrollers: Architecture, Programming, Interfacing and System Design I, Pearson Education, 2005.

WEB RESOURCES

- Web resources from NDL Library, E-content from open source libraries
- <https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>

PRACTICAL : HTML
(Course Code: 23UAIE12)

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|---------------------|--------------|------------------|------------------|------------------------|
| SEMESTER - I | EC-P2 | HOURS - 2 | CREDITS-2 | TOTAL HOURS: 30 |
|---------------------|--------------|------------------|------------------|------------------------|

LIST OF PROGRAMS

1. Write a HTML Program using header tags.
2. Write a HTML Program for creating class timetable.
3. Write a HTML Program to list out the car details using ordered list.
4. Write a HTML Program to import an image.
5. Write a HTML Program to test text formating like bold, italic etc.
6. Write a HTML Program to set the hyperlink.
7. Write a HTML Program to list out the courses details using unordered list.
8. Write a HTML program to display hello world.
9. Write a HTML program to type a paragraph with different font and color.
10. Write a HTML program to define subscripted and superscripted.
11. Write a HTML program to import a video.
12. Write a HTML program to create login window using form controls.

PRACTICAL : MICROPROCESSOR

(Course Code: 23UAIE12)

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|---------------------|--------------|------------------|--------------------|------------------------|
| SEMESTER - I | EC-P2 | HOURS - 2 | CREDITS - 2 | TOTAL HOURS: 30 |
|---------------------|--------------|------------------|--------------------|------------------------|

LIST OF PROGRAMS

I. Addition and Subtraction

1. 8-bit addition
2. 8-bit subtraction

II. Multiplication and Division

1. 8-bit multiplication
2. 8-bit division

III. Sorting and Searching

1. Searching for an element in an array.
2. Sorting in Ascending and Descending order.

IV. Code Conversion

1. BCD to Hex and Hex to BCD.
2. Binary to ASCII and ASCII to binary.

POWER BI
(Course Code: 24UAIN11)

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|---------------------|-------------|------------------|--------------------|------------------------|
| SEMESTER - I | SEC1 | HOURS – 2 | CREDITS – 2 | TOTAL HOURS: 30 |
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COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

- CO1:** Define the functions and components of Power BI. **(K1)**
- CO2:** Describe the loading of data from Excel, CSV and MS SQL server files. **(K2)**
- CO3:** Examine the concept of Data Modeling using Power BI. **(K3)**
- CO4:** Analyze the various mathematical, information and logical DAX functions. **(K4)**
- CO5:** Evaluate the creation of multi-page reports. **(K5)**
- CO6:** Design the visualization cards with bar chart, line chart and scatter chart. **(K6)**

UNIT I INTRODUCTION (6 HOURS)

Introduction: Understanding Business Intelligence – Advantages of a Business Intelligence (BI) system – Business Intelligence components – Functions of Power BI – Power BI components – Power BI Environment – Different users of Power BI – Power BI desktop installation.

UNIT II DATA CONNECTIONS (6 HOURS)

Data connections in Power BI: Connecting to data – Connecting to database tables – Understanding Power Query Editor – Loading data from an Excel file – Loading multiple CSV files from a folder – Loading data from MS SQL server – Creating static table in Power BI – Connecting to web data source – Connecting and loading the data from Microsoft SharePoint.

UNIT III DATA MODELING (6 HOURS)

Introduction to Data Modeling: Best practices of data modeling – Combining queries – Using joins – Left outer join – Right outer join – Full outer join – Inner join – Left anti and Right anti join – Merge Queries in Power BI – Append Queries in Power BI.

UNIT IV DATA ANALYSIS EXPRESSIONS (DAX) (6 HOURS)

Data Analysis Expressions: Introduction – DAX Functions – Mathematical Functions – Information Functions – Logical Functions – If and Switch Filter Functions – Date and time Functions.

UNIT V VISUALIZATIONS IN POWER BI (6 HOURS)

Introduction to Power BI reports: Creating multi-page reports using visualizations – Remove any pages or visualization card – Copy/Paste a visualization card – Creating Bar chart – Line chart – Stacked column chart – Ribbon chart – Waterfall chart – Scatter chart.

TEXT BOOK

Chandraish Sinha, “Mastering Power BI”, BPB Publications, 2021.

REFERENCE BOOKS

1. Alan Murray, “Power BI for Jobseekers”, BPB Publications, 2023.
2. Jack Hyman, “Microsoft Power BI for Dummies”, Wiley India Pvt. Ltd., 2023.

WEB RESOURCES

- <https://www.coursera.org/professional-certificates/>
- <https://www.geeksforgeeks.org/power-bi-tutorial/>

PRACTICAL: DATA STRUCTURES USING C++

(Course Code: 24UAIC22)

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|----------------------|------------------|------------------|--------------------|------------------------|
| SEMESTER - II | CORE – P2 | HOURS - 4 | CREDITS – 3 | TOTAL HOURS: 60 |
|----------------------|------------------|------------------|--------------------|------------------------|

LIST OF PROGRAMS

1. Program to implement various operations on Array.
2. Program to implement Stack Operations.
3. Program to implement applications of Stack: Reverse a string.
4. Program to implement applications of Stack: Infix to Postfix
5. Program to implement applications of Stack: Evaluating Postfix Expressions.
6. Program to implement Queue Operations.
7. Program to implement Singly Linked List.
8. Program to add two Polynomials using Linked List.
9. Program to implement Tree traversals.
10. Program to construct minimal cost spanning tree of a graph.
11. Program to implement Binary Search.
12. Program to implement Merge sort.

INTRODUCTION TO STATISTICS
(Course Code: 24UAIE21)

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|----------------------|----------------|------------------|--------------------|------------------------|
| SEMESTER - II | EC – T2 | HOURS – 4 | CREDITS – 3 | TOTAL HOURS: 60 |
|----------------------|----------------|------------------|--------------------|------------------------|

Course outcomes: After completing this course, a student will have:

- CO1:** Identify the suitable method of statistics on the given data to solve the problem of any heuristic approach of prediction.
- CO2:** Apply appropriate statistical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
- CO3:** Design and analyze real world problems
- CO4:** Apply various statistical and modeling techniques for providing the solutions
- CO5:** Formulate suitable statistical method required as pre-processing technique for finding the solution of machine learning algorithm.
- CO6:** Model and solve computing problem using correlation, and resampling using appropriate statistics algorithms.

UNIT – I **(12 Hours)**

Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes.

UNIT – II **(12 Hours)**

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.

UNIT – III **(12 Hours)**

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

UNIT – IV **(12 Hours)**

Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth- Marshall and Fisher's Ideal Index numbers. Errors in Index numbers. Chain index numbers, conversion of fixed based to chain-based index numbers and vice-versa. Consumer price index numbers. Uses and limitations of index numbers.

UNIT – V **(12 Hours)**

Linear correlation - scatter diagram, Pearson's coefficient of correlation, computation of coefficient of correlation from a bivariate frequency distribution, Rank correlation, Coefficient of concurrent deviation- Regression equations - properties of regression coefficients

TEXT BOOKS:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8thEdn. The World Press, Kolkata.
2. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals of Mathematical Statistics, 4thEdition (Reprint), Sultan Chand & Sons

SUGGESTED READINGS:

1. Miller, Irwin and Miller, Marylees(2006): John E.Freund's Mathematical Statistics with Applications, (7thEdn.), Pearson Education, Asia.
2. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rdEdn., (Reprint), Tata McGraw-Hill Pub. Co.Ltd.
3. Mukhopadhyay, P. (1999): Applied Statistics, New Central Book Agency
4. Gupta, S.C. and V.K. Kapoor (2002) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
5. Spiegel, M.R. and Stephens, L. (2010) Statistics, Schaum's Outline Series, Mc Graw Hill, New York.

WEB RESOURCES

- <http://file.allitebooks.com/20151204/Foundations%20of%20Statistical%20Algorithms.pdf>
- http://onlinestatbook.com/Online_Statistics_Education.pdf
- <https://upload.wikimedia.org/wikipedia/commons/8/82/Statistics.pdf>
- <http://cnx.org/content/col10522/1.38/pdf>
- <http://www.greenteapress.com/thinkstats/thinkstats.pdf>

PRACTICAL : STATISTICS
(Course Code: 24UAIE22)

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|----------------------|--------------|------------------|------------------|------------------------|
| SEMESTER - II | EC-P2 | HOURS - 2 | CREDITS-2 | TOTAL HOURS: 30 |
|----------------------|--------------|------------------|------------------|------------------------|

LIST OF PRACTICALS:

1. Graphical representation of data.
2. Problems based on measures of central tendency.
4. Problems based on measures of dispersion.
5. Problems based on moments, skewness and kurtosis.
6. Karl Pearson and rank correlation coefficient.
7. Lines of regression, angle between lines and estimated values of variables.
8. Calculate price and quantity index numbers using simple and weighted average of price relatives.

TEXT BOOK

S.D. Sharma, “Operations Research”, Kedamath Ramnath & Co. Meerut, 2018

REFERENCE BOOKS

1. HamdyTaha, “Operations Research”, Prentice Hall, 2010.
2. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, “Resource Management Techniques”, A.R. Publications, 2016.

WEB RESOURCES

- https://www.tutorialspoint.com/linear_programming/index.asp
- <https://www.analyticsvidhya.com/blog/2017/02/introductory-guide-on-linear-programming>
- <https://commerceiets.com/assignment>

PRACTICAL : OPERATIONS RESEARCH USING C++

(Course Code: 24UAIE22)

| | | | | |
|----------------------|--------------|------------------|--------------------|------------------------|
| SEMESTER - II | EC-P2 | HOURS - 2 | CREDITS - 2 | TOTAL HOURS: 30 |
|----------------------|--------------|------------------|--------------------|------------------------|

LIST OF PROGRAMS

1. Program for formulation of Linear Programming Problem.
2. Implementing North-West Corner Rule
3. Implementing Least Cost method
4. Program to implement Transportation Problem.
5. Program to implement Assignment Problem.
6. Program to implement PERT / CPM.

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

(Course Code : 24UAIN21)

| | | | | |
|----------------------|-------------|------------------|--------------------|------------------------|
| SEMESTER - II | SEC2 | HOURS - 2 | CREDITS - 2 | TOTAL HOURS: 30 |
|----------------------|-------------|------------------|--------------------|------------------------|

COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Understand AI foundations, history, agents, rationality, environments, and agent structure. **(K1)**

CO2: Master problem-solving, search strategies, and heuristic functions in AI. **(K2)**

CO3: Grasp logical agents, propositional logic, and theorem proving techniques. **(K3)**

CO4: Learn supervised learning, decision trees, and hypothesis evaluation in AI. **(K4)**

CO5: Comprehend reinforcement learning, passive/active learning, and generalization techniques. **(K5)**

CO6: Demonstrate proficiency in applying AI techniques to solve real-world problems. **(K5)**

UNIT I INTRODUCTION (6 HOURS)

Introduction: What Is AI? - The Foundations of Artificial Intelligence - The History of Artificial Intelligence – The State of the Art - **Intelligent Agents:** Agents and Environments - Good Behavior: The Concept of Rationality – The Nature of Environments – The Structure of Agents

UNIT II SEARCHING (6 HOURS)

Solving Problems by Searching: Problem-Solving - Searching for Solutions - Uninformed Search Strategies - Informed (Heuristic) Search Strategies - Heuristic Functions

UNIT III LOGICAL AGENTS (6 HOURS)

Logical Agents : Knowledge-Based Agents - The Wumpus World - Logic - Propositional Logic: A Very Simple Logic - Propositional Theorem Proving

UNIT IV LEARNING (6 HOURS)

Learning: Learning from Examples – Forms of Learning - Supervised Learning - Learning Decision Trees - Evaluating and Choosing the Best Hypothesis

UNIT V REINFORCEMENT LEARNING (6 HOURS)

Reinforcement Learning: Introduction - Passive Reinforcement Learning – Active Reinforcement Learning - Generalization in Reinforcement Learning

TEXT BOOK

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall.

REFERENCE BOOKS

1. Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011.
3. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press, 2010.
4. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill.

WEB RESOURCES

- NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems.
- <https://nptel.ac.in/courses/106106140/>
- <https://nptel.ac.in/courses/106106126/>

ADD ON COURSES

OFFICE AUTOMATION (Course Code: 24UAIAO1)

| | | |
|---------------------|--------------------|------------------------|
| SEMESTER - I | CREDITS – 2 | TOTAL HOURS: 30 |
|---------------------|--------------------|------------------------|

COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Define basic functions and new formatting features in Word 2010.(K1)

CO2: Describe the Header and Footer content and update page numbers and dates.(K2)

CO3: Examine the various features of Word. (K3)

CO4: Analyze the formatting techniques.(K4)

CO5: Evaluate the process of adding pictures, wordart and animations.(K5)

CO6: Design various tables and lists. (K6)

UNIT I INTRODUCTION (6 HOURS)

Create and Manage Documents - Open a PDF in Word for editing - Insert text from a file or external source - Navigate Through a Document - Insert hyperlinks - Search for text - Create bookmarks - Move to a specific location or object in a document - Format a Document – Spell check.

UNIT II PAGE SETUP (6 HOURS)

Modify page setup - Apply document themes - Apply document style sets - Insert headers and footers - Insert page numbers - Format page background elements - Customize Options and Views for Documents - Change document views – Bullets & Numbering.

UNIT III FORMATTING TEXT (6 HOURS)

Format Text, Paragraphs, and Sections - Insert Text and Paragraphs - Find and replace text - Cut, copy and paste text - Replace text by using AutoCorrect - Insert special characters - Format Text and Paragraphs - Apply font formatting - Apply formatting by using Format Painter - Set line and paragraph spacing and indentation - Clear formatting – Headers & Footers - Apply built-in styles to text.

UNIT IV FORMATTING PAGE (6 HOURS)

Change text to WordArt - Order and Group Text and Paragraphs - Format text in multiple columns - Insert page, section, or column breaks - Change page setup options for a section - Create Tables and Lists - Create a Table - Convert text to tables - Convert tables to text - Create a table by specifying rows and columns - Apply table styles - Modify a Table - Sort table data - Configure cell margins and spacing - Merge and split cells - Resize tables, rows, and columns - Split tables

UNIT V FORMAT GRAPHIC ELEMENTS (6 HOURS)

Insert Images and table captions – Charts & Cliparts- Create and Manage Simple References Insert shapes - Insert pictures - Insert a screen shot or screen clipping - Insert text boxes Format Graphic Elements - Apply artistic effects - Apply picture effects - Remove picture backgrounds -Format objects - Apply a picture style - Wrap text

TEXT BOOK

Tom Bunzel, “Easy Microsoft Office 2010”, Que Publishing, First Edition, 2010.

REFERENCE BOOKS

Gary B. Shelly, Misty E. Vermaat, “Microsoft Office 2010: Introductory”, Cengage Learning, First Edition 2012.

WEB RESOURCES

1. <https://www.javatpoint.com/ms-word-tutorial>
2. <https://www.tutorialspoint.com/word/index.html>

NATURAL LANGUAGE PROCESSING

(Course Code: 24UAIAO2)

SEMESTER - II

CREDITS – 2

TOTAL HOURS:

COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

CO1: Define the fundamental concepts and techniques of natural language processing. **(K1)**

CO2: Describe the advantages and disadvantages of different NLP. **(K2)**

CO3: Examine various techniques, taking in to account the assumptions, strengths, and weaknesses of each. **(K3)**

CO4: Analyze large volume text data generated from a range of real-world applications. **(K4)**

CO5: Evaluate language models. **(K5)**

CO6: Demonstrate NLP methods that perform topic modelling. **(K6)**

UNIT I INTRODUCTION (6 HOURS)

Introduction : Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics – Information theory – Collocations.

UNIT II LANGUAGE MODELS (6 HOURS)

N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.

UNIT III SYNTACTIC ANALYSIS (6 HOURS)

Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions – Finite-State Automata – Morphological Parsing – Spelling Error Detection and correction – Words and Word classes

UNIT IV SEMANTIC ANALYSIS (6 HOURS)

Semantic analysis and Discourse Processing: Semantic Analysis – Meaning Representation – Lexical Semantics – Ambiguity – Word Sense Disambiguation.

UNIT V MACHINE TRANSLATION (6 HOURS)

Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages – Machine Translation Approaches – Translation involving Indian Languages.

TEXT BOOKS

1. Daniel Jurafsky and James H. Martin, “Speech & language processing”, Pearson publications, 2008.
2. Allen, James. “Natural language understanding”. Pearson, 1995.

REFERENCE BOOKS

1. Pierre M. Nugues, “An Introduction to Language Processing with Perl and Prolog”, Springer, 2006.
2. Mohamed Zakaria Kurdi, “Natural Language Processing and Computational Linguistics 1, speech, Morphology, and syntax”, Wiley, ISTE Ltd, 2016.

WEB RESOURCES

- https://en.wikipedia.org/wiki/Natural_language_processing
- https://www.tutorialspoint.com/natural_language_processing/index.htm
- <https://www.geeksforgeeks.org/natural-language-processing-nlp-tutorial/>
- <https://www.javatpoint.com/nlp>

FUNDAMENTALS OF COMPUTERS
(Course Code : 23UCAEC1)

SEMESTER - I

ECC

CREDITS – 2

COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

- CO1:** Identify and analyze computer hardware, software, and network components. **(K1)**
- CO2:** Explain the needs of hardware and software required for a computation task. **(K2)**
- CO3:** Demonstrate the building up of Sequential and combinational logic from basic gates. **(K3)**
- CO4:** Analyze compression techniques and file formats to determine effective ways of securing, managing, and transferring data. **(K4)**
- CO5:** Make intelligent computer purchase decisions. **(K5)**
- CO6:** Integrating hardware and software. **(K6)**

UNIT I EVOLUTION OF COMPUTERS

Evolution of Computers: Generations – Types of computers – Computer system characteristics – Basic components of a Digital Computer – Control unit – ALU – Input/Output functions and memory – Memory addressing capability of a CPU – Word length of a computer – Processing speed of a computer – Computer Classification.

UNIT II INPUT AND OUTPUT UNITS

Input/Output Units: Keyboard – Mouse – Trackball – Joystick – Digitizing tablet – Scanners – Digital Camera – MICR – OCR – OMR - Bar-code Reader - Voice Recognition – Light pen – Touch Screen - Monitors and types of monitor – Digital – Analog – Size – Resolution – Refresh Rate – Dot Pitch – Video Standard – VGA – SVGA – XGA etc. – Printers & types – Daisy wheel – Dot Matrix – Inkjet – Laser – Line Printer – Plotter – Sound Card and Speakers.

UNIT III MEMORY

Memory: RAM – ROM – EPROM - PROM and other types of memory – Storage fundamentals – Primary vs. Secondary Data Storage – Various Storage Devices – Magnetic Tape – Magnetic Disks – Cartridge Tape – Hard Disk Drives – Floppy Disks (Winchester Disk) – Optical Disks – CD – VCD – CD-R – CD-RW – Zip Drive – Flash drives Video Disk – Blue Ray Disc – SD/MMC Memory cards – Physical structure of floppy & hard disk – Drive Naming Conventions in PC – DVD – DVD-RW – USB Pen drive.

UNIT IV SOFTWARE AND ITS TYPES

Software and its Need: Types of Software – System software – Application software – System Software – Operating System – Utility Program – Algorithms – Flow Charts – Symbols – Rules for making Flow chart – Programming languages – Assemblers – Compilers and Interpreter – Computer Applications in various fields.

UNIT V INTERNET CONCEPTS

Internet Concepts: Introduction to Internet – Connecting to the Internet Hardware – Software & ISPs – Search Engines – Web Portals – Online Shopping – Email – Types of Email – Compose and send a message – Reply to a message – Working with emails – Surfing in the Internet.

TEXT BOOKS

1. P.K. Sinha, “Computer Fundamentals”, New Age International Publishers, 2014.
2. <https://www.edutechlearners.com/computer-fundamentals-p-k-sinha-free-pdf>

REFERENCE BOOKS

1. S.K. Basandra, “Computers Today”, Galgotia Publications.
2. Shree SaiPrakashan, “PC Software”, Meerut.

WEB RESOURCES

1. <https://www.geeksforgeeks.org/computer-fundamentals-tutorial/>
2. <https://www.freecodecamp.org/news/computer-basics-for-absolute-beginners/>

INTRODUCTION TO DATA SCIENCE
(Course Code : 24UAIEC2)

SEMESTER - II

ECC

CREDITS - 2

COURSE OUTCOMES:

On successful completion of the course, **the** learners will be able to

CO1: Describe the basics concepts of Data science. **(K1)**

CO2: Demonstrate the data analysis. **(K2)**

CO3: Describe the Machine learning algorithms. **(K3)**

CO4: Analyze the model building process. **(K4)**

CO5: Examine the features of Hadoop. **(K4)**

CO6: Implement Data science in the applications. **(K5)**

UNIT I INTRODUCTION

Introduction to Data Science – Benefits and uses – Facets of data – Data Science process – Big Data ecosystem and Data Science.

UNIT II MODEL BUILDING

The Data Science process – Overview – Research goals – Retrieving data – transformation – Exploratory Data Analysis – Model building.

UNIT III ALGORITHMS

Algorithms – Machine Learning algorithms – Modeling process – Types – Supervised – Unsupervised – Semi-supervised Learning algorithms.

UNIT IV HADOOP

Introduction to Hadoop – framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types.

UNIT V PREDICTION AND EXPLORATION

Case Study – Prediction of Disease – Setting research goals – Data retrieval – Preparation – Exploration – Disease profiling – Presentation and automation.

TEXT BOOK

Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications, 2016.

REFERENCE BOOKS

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.
2. Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2017, 1st Edition.
3. Lillian Pierson, “Data Science for Dummies”, 2017, 2nd Edition.

WEB RESOURCES

1. <https://www.scribd.com/document/318279227/Introducing-Data-Science>
2. <https://livebook.manning.com/book/introducing-data-science>
3. https://www.w3schools.com/datascience/ds_introduction.asp