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## **VALUE ADDED COURSES OFFERED AT UNIVERSITY COMPUTER CENTRE**

**VAC-101: PYTHON PROGRAMMING IN MACHINE LEARNING**

**VAC-102: COMPUTER SYSTEM SECURITY**

**VAC-103: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

**VAC-104: CYBER LAWS AND SECURITY**

**VAC-105: ADVANCED WEB PROGRAMMING**

**VAC-106: DIGITAL MARKETING**

**VAC-107: COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**

## Syllabus of Value Added Course

### VAC-101: PYTHON PROGRAMMING IN MACHINE LEARNING

| UNIT      | TOPIC   | Hours |
|-----------|---|-------|
| UNIT<br>1 | <p><b>Introduction:</b> The Programming Cycle for Python , Python IDE, Interacting with Python Programs, import statement</p> <p><b>Values and types:</b> Variables, Variable names and keywords</p> <p><b>Operators and operands , Expressions and statement:</b> String operations, Assignment Statement, Arithmetic Operators, Boolean Expression, Logical operators, Operator Precedence, Expression Evaluation &amp; Float Representation.</p>   | 6     |
| UNIT<br>2 | <p><b>Conditional statement:</b> if-else statement, its working and execution</p> <p>Nested-if statement and Elif statement in Python</p> <p><b>Iterations:</b> for loop- Multiple assignment, Updating variables, While loop including its working, Nested Loops , Break and Continue.</p>   | 6     |
| UNIT<br>3 | <p><b>Function:</b> Function calls, Type conversion, Math functions, Parts of A Function , Execution of A Function</p> <p>Defining a new function: The def statement, Returning values, Parameters, Arguments,</p> <p>Scope Rules: Local variables, Global variables and the global statement, stack diagrams, Composition</p>  | 6     |
| UNIT<br>4 | <p>Recursive functions, Infinite recursion, Boolean functions Incremental development- scaffolding, The square root algorithm –implementation and debugging</p> <p><b>Strings:</b> Traversal with a for loop, String slices, Strings are immutable , Searching , Looping and counting, String methods, The in operator, String comparison</p> <p><b>List and Dictionaries:</b> list operations, list slice, List methods, Dictionary as a set of counters, Looping and dictionaries, Reverse lookup, Dictionaries and lists, Tuples, Sets</p> | 4     |
| UNIT<br>5 | <p>Machine Learning : Supervise Learning – Decision Tree, K-Nearest Neighbour, Random Forest, Naïve Bayes .</p>   | 8     |

## VAC-102: COMPUTER SYSTEM SECURITY

| UNIT      | Topic  | Hours |
|-----------|--|-------|
| UNIT<br>1 | <b>Computer System Security Introduction:</b> Introduction, What is computer security and what to learn? , Sample Attacks, The Marketplace for vulnerabilities,<br><b>Hijacking &amp; Defense:</b> Control Hijacking ,More Control Hijacking attacks integer overflow ,More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced Control Hijacking attacks.   | 6     |
| UNIT<br>2 | <b>Confidentiality Policies:</b> Confinement Principle ,Detour Unix user IDs process IDs and privileges, More on confinement techniques ,System call interposition ,VM based isolation ,Confinement principle ,Software fault isolation , Rootkits ,Intrusion Detection Systems  | 6     |
| UNIT<br>3 | <b>Secure architecture principles isolation and leas:</b> Access Control Concepts , Unix and windows access control summary ,Other issues in access control ,Introduction to browser isolation .<br><b>Web security landscape :</b> Web security definitions goals and threat models , HTTP content rendering .Browser isolation .Security interface , Cookies frames and frame busting, Major web server threats ,Cross site request forgery ,Cross site scripting ,Defenses and protections against XSS , Finding vulnerabilities ,Secure development. | 6     |
| UNIT<br>4 | <b>Basic cryptography:</b> Public key cryptography ,RSA public key crypto ,Digital signature Hash functions ,Public key distribution ,Real world protocols ,Basic terminologies ,Email security certificates ,Transport Layer security TLS ,IP security , DNS security.  | 6     |
| UNIT<br>5 | <b>Internet Infrastructure:</b> Basic security problems , Routing security ,DNS revisited ,Summary of weaknesses of internet security ,.Link layer connectivity and TCP IP connectivity , Packet filtering firewall ,Intrusion detection.  | 6     |

**VAC-103: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

| <b>UNIT</b> | <b>TOPIC</b>  | <b>Hours</b> |
|-------------|---|--------------|
| UNIT<br>1   | <b>INTRODUCTION :</b><br>Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.   | 4            |
| UNIT<br>2   | <b>PROBLEM SOLVING METHODS:</b><br>Local Search Algorithms and Optimization Problems : Brute Force Search, Depth First/Breadth First Search, Heuristic Search: Hill Climbing, Constraint Satisfaction, Mean End Analysis, Best First Search, A* Algorithm, AO* Algorithm, Beam Search.  | 6            |
| UNIT<br>3   | <b>Learning Systems:</b> Goals and applications of machine learning What Is Machine Learning (ML)? Uses and Applications with examples, Types of Machine Learning, Main Challenges of Machine Learning, Testing and Validating. End to End Machine Learning: Working with Real Data, Frame the Problem, Select the Performance Measure, Prepare the Data for ML Algorithms, Aspects of developing a learning system: training data, concept representation, function approximation ,Training and Evaluating the Data Set. | 6            |
| UNIT<br>4   | <b>Regression:</b> Naive Bayes learning algorithm, Parameter smoothing, Generative vs. discriminative training, Logistic regression, Bayes theorem and Markov models.<br><b>Classification:</b> Binary Classification- Support vector machines, Decision Tree, Multiclass classification, K- nearest neighbors<br>Case study on IRIS and MNIST datasets.  | 6            |
| UNIT<br>5   | <b>Clustering and Unsupervised Learning:</b> Learning from unclassified data. Clustering. Hierarchical Agglomerative Clustering, K means, Spectral clustering;<br><br><b>Introduction to Artificial Neural Networks:</b> Neurons and biological motivation. Linear threshold units. Perceptions: representational limitation and gradient descent training. Multilayer networks and back propagation. Hidden layers and constructing intermediate, distributed representations.   | 8            |

**VAC-104: CYBER LAWS AND SECURITY**

| <b>UNIT</b> | <b>Topics</b>   | <b>Hours</b> |
|-------------|---|--------------|
| UNIT 1      | <b>Introduction to Cyber security:</b> Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.   | 6            |
| UNIT 2      | <b>Cyber crime and Cyber law:</b> Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime<br>IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India  | 6            |
| UNIT 3      | <b>Social Media Overview and Security:</b> Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.   | 6            |
| UNIT 4      | <b>E - C o m m e r c e and Digital Payments:</b> Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures.<br>RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007, | 6            |
| UNIT 5      | <b>Digital Devices S e c u r i t y , Tools and Technologies for Cyber Security:</b> End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.  | 6            |

### VAC-105: ADVANCED WEB PROGRAMMING

| UNIT   | TOPICS   | Hours |
|--------|--|-------|
| UNIT 1 | <p><b>Introduction to web:</b> Architecture of the Web HTTP Protocols(1), Stateless nature of the protocol, Methods (GET, POST, HEAD, PUT, DELETE), HTTP session, Status codes, Persistent connections, HTTPS</p> <p><b>HTML:</b> Elements, Objects, Events, Canvas, Document Object Model (DOM), Elements, Events</p>   | 6     |
| UNIT 2 | <p><b>CSS:</b> Styling HTML with CSS, Inline Styling (Inline CSS), External Styling (External CSS), CSS Fonts, Color Background Cursor, -Lists Tables, The CSS Box Model, CSS Selectors, The id Attribute, The class Attribute, HTML Style Tags, Display Positioning, CSS Floats</p> <p><b>Introduction to XML:</b> XML Validation, Reason for XML, XML Tree Structure, XML DOM, XML DTD, XML Schema,</p>  | 6     |
| UNIT 3 | <p><b>JavaScript:</b> Introduction to JavaScript: Variable, statements, Operators, Comments, constructs, Functions, expressions, Javascript console, Scope, Events, Strings, String Methods, Numbers, Number Methods, Dates, Date Formats, Date, Methods, Arrays, Array Methods, Booleans, Comparisons</p> <p>Control Structures: Conditions, Switch, Loop For, Loop While, Break</p> <p>Functions: Function Definitions, Function Parameters, Function Invocation, Function Closures</p> <p>Objects</p> | 6     |
| UNIT 4 | <p><b>jQuery:</b> Basics of jQuery, jQuery selection and events, jQuery Effects, jquery traversal and manipulation, Data attributes and templates, jQuery Plugins, Jquery / Google Web Toolkit</p>   | 4     |
| UNIT 5 | <p><b>PHP:</b> Introduction to PHP, Working with arrays, Functions, Forms, Handling date and Times, Working with Files, Session and state management, Database operations from PHP</p> <p><b>Real world Application:</b> Online Quiz System, Online Student feedback System</p>  | 8     |

**VAC-106: DIGITAL MARKETING**

| <b>UNIT</b> | <b>TOPICS</b>   | <b>Hours</b> |
|-------------|---|--------------|
| UNIT 1      | <p><b>Introduction to Digital Marketing:</b><br/>Evolution of Digital Marketing from traditional to modern era, Role of Internet, Emergence of digital marketing as a tool, , Digital marketing strategy, P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.</p> <p><b>Internet Marketing and Digital Marketing Mix:</b> Internet Marketing, opportunities and challenges, Digital marketing framework, Digital Marketing mix, Search Engine Advertising: Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation Display marketing: Types of Display Ads -Buying Models o Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA). Analytical Tools,YouTube marketing</p> | 8            |
| UNIT 2      | <p><b>Social Media Marketing –Tools &amp; Plan:</b> Introduction to social media platforms, Building a successful social media marketing strategy Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Facebook Marketing Tools Digital Marketing Strategies through Instagram, youtube etc..</p>   | 6            |
| UNIT 3      | <p><b>Mobile Marketing:</b> Mobile Advertising, Forms of Mobile Marketing, Mobile Campaign Development, Mobile Advertising Analytics Introduction to SEO, SEM, Web Analytics</p>  | 4            |
| UNIT 4      | <p><b>Trends in Digital Advertising:</b> Introduction and need for SEO, How to use internet &amp; search engines, Search engine and its working pattern, On-page and off-page optimization, SEO Tactics. Introduction to SEM Web Analytics: Google Analytics &amp; Google AdWords, Data collection for web analytics.</p>   | 10           |
| UNIT 5      | <p><b>Application:</b> A group of two students (Maximum) has to work on creating an advertising campaign through any form of digital marketing The student/s should work on creating the campaign, running the campaign, presenting the results of the campaign in terms of Lead Generation and / or sales and / or web analytics.</p>  | 2            |

**VAC-107: COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**

| <b>UNIT</b> | <b>TOPICS</b>  | <b>Hours</b> |
|-------------|--|--------------|
| UNIT 1      | <b>Basics of Communication:</b> Basics of communication: Introduction, meaning and definition, process of communication.Types of communication: formal and informal, verbal, non-verbal and written Barriers to effective communication. 7 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous). | 8            |
| UNIT 2      | Oral Skills: Presentation Skills – Defining Purpose of Presentation, Importance of Presentation, Planning of Presentation, Making effective presentations, Mock Interview - The Interview Process, Pre-Interview Preparation, Answering Strategies   | 8            |
| UNIT 3      | Professional Writing, Office Drafting: Circular, Notice and Memo,Précis writing, Letters: business and personnel, E-mail Etiquettes, Report Writing  | 6            |
| UNIT 4      | Personality Development: Self Confidence/ Confidence Building, Positive Attitude, Time Management,Stress Management  | 8            |