



Krishna Kanta Handiqui State Open University

Hiranya Chandra Bhuyan School of Science and Technology

Discipline of Computer Science

Programme name:

CERTIFICATE IN AI-ASSISTED PROGRAMMING AND CYBER SECURITY

Total Credits: 20

Minimum Qualification: Class 10+2 passed

Course Structure:

COURSE 1: AI-ASSISTED WEB PROGRAMMING
COURSE 2: AI-ASSISTED PYTHON PROGRAMMING
COURSE 3: DIGITAL MARKETING
COURSE 4: CYBER SECURITY
COURSE 5: PRACTICAL

DETAILED COURSE-WISE SYLLABUS

COURSE 01: AI-ASSISTED WEB PROGRAMMING

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objectives:

- Understand the fundamentals of AI-assisted development, including prompt engineering, AI coding assistants, and the role of machine learning concepts in modern web programming.
- Develop front-end web applications using HTML, CSS, JavaScript, and front-end frameworks with the support of AI-powered development environments.
- Build and integrate back-end systems, databases, and APIs using AI-assisted tools to create full-stack web applications.
- Apply AI-based testing, debugging, deployment strategies, and ethical security

practices to develop secure, optimized, and production-ready web applications.

Course Outcome:

On completion of this course, the learners will be able to:

- Utilize AI-assisted IDEs and prompt-writing techniques to generate, modify, and optimize web development code efficiently and responsibly.
- Design and implement responsive and interactive front-end web interfaces using modern web technologies with AI support.
- Develop full-stack web applications by integrating server-side programming, databases, and REST APIs using AI-assisted tools.
- Evaluate, test, debug, secure, and deploy web applications while demonstrating ethical use of AI and adherence to cybersecurity best practices.

Unit 1: Introduction to AI-Assisted Web Programming

Introduction to Artificial Intelligence in web development, overview of AI coding assistants, basic concepts of machine learning in programming, advantages and limitations of AI tools, introduction to prompt writing for generating code, and applications of AI in modern web development.

Unit 2: AI-Powered Development Environment and IDEs

Introduction to development environments, installation and setup of AI-enabled IDEs (such as VS Code with AI plugins), code auto-completion, documentation generation using AI, basic Git and version control support, and improving coding productivity using AI tools.

Unit 3: AI-Assisted HTML Fundamentals

Basics of HTML structure, tags, attributes, forms, tables, semantic HTML elements, accessibility basics, webpage layout generation using AI tools, and basic SEO-friendly HTML coding.

Unit 4: AI-Assisted CSS and Styling

Introduction to CSS, selectors, colors, fonts, box model, layout techniques (Flexbox, Grid basics), simple animations, responsive styling basics, and using AI tools to generate CSS styles and UI designs.

Unit 5: Responsive Web Design

Concept of responsive design, media queries, mobile-first approach, viewport settings, responsive images, basic UI adaptation techniques, and AI assistance for responsive layout suggestions.

Unit 6: JavaScript Fundamentals with AI

Introduction to JavaScript, variables, data types, operators, functions, events, conditional statements, loops, simple debugging with AI assistance, and basic client-side scripting.

Unit 7: DOM Manipulation Using AI

Understanding DOM structure, selecting elements, event handling, form validation basics, dynamic content updates, and AI-assisted debugging and script improvement.

Unit 8: AI-Assisted Front-End Frameworks

Basic introduction to front-end frameworks (React/Vue/Angular overview), component concept, simple UI development, project scaffolding with AI tools, and basic front-end application structure.

Unit 9: AI-Assisted Back-End Frameworks

Introduction to server-side programming, Node.js or Python backend basics, handling requests and responses, basic REST API concept, simple backend coding with AI support.

Unit 10: Database Integration with AI Assistance

Introduction to databases, SQL basics, CRUD operations, database connectivity in web apps, introduction to NoSQL, simple schema design, and AI-assisted query generation.

Unit 11: AI-Assisted Testing and Debugging

Basics of software testing, debugging techniques, common coding errors, AI-based error detection, performance optimization basics, and testing simple web applications.

Unit 12: Web Security and Ethics in AI Programming

Introduction to web security, common vulnerabilities (XSS, SQL injection basics), password security, data privacy concepts, ethical AI use, plagiarism concerns, and responsible coding practices.

Unit 13: AI-Assisted Deployment

Basics of web hosting, domain and server concepts, cloud deployment introduction, version control deployment, simple CI/CD overview, and AI assistance in deployment processes.

Unit 14: Advanced AI-Assisted Web Programming

Introduction to chatbot integration, AI APIs, automated UI generation, intelligent web applications, future trends in AI web development, and basic mini-project development.

COURSE 02: AI-ASSISTED PYTHON PROGRAMMING

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Develop a strong foundation in Python programming concepts including data types, control structures, functions, object-oriented programming, and file handling.
- Gain hands-on experience in configuring and using Python development environments, including AI-assisted IDEs and cloud-based platforms.
- Learn to integrate AI tools effectively to enhance coding productivity, debugging, optimization, and problem-solving.
- Apply Python libraries such as NumPy, Pandas, and Matplotlib for data handling, analysis, and visualization in real-world applications.

Course Outcome:

On completion of this course, the learners will be able to:

- Install, configure, and work efficiently in Python environments such as Jupyter Notebook, Google Colab, and AI-assisted IDEs.
- Write structured Python programs using appropriate data structures, control statements, functions, modules, and object-oriented programming principles.
- Utilize AI-assisted development tools responsibly to generate, debug, and optimize Python code while critically evaluating AI outputs.
- Analyze, manipulate, and visualize data using Python libraries such as NumPy, Pandas, and Matplotlib to solve basic real-world computational problems.

UNIT 1: Installation of Python

Python Installation, Working with Google Colab, Anaconda Installation, Working with Jupyter Notebook, Spyder

UNIT 2: Introduction to Python with AI-Assisted IDEs

Various AI-Assisted IDEs for Python, Basic Python Programming vs AI-Assisted

Programming, Examples

UNIT 3: Python Basics

Atoms, Identifiers and keywords, Literals, Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment operator, Bit wise operator, Identity and Membership operator.

UNIT 4: Strings

Strings, String properties, Built-in functions, String Methods, String Conversions, String Comparisons

UNIT 5: Decision Control Statements

Input and Output Statements, Control statements, Conditional Statements- if...else, Nested if statements, Ternary Operators.

UNIT 6: Loop Control Statements

Looping- while Loop, for Loop, Loop Control, break, continue and pass.

UNIT 7: Lists

Lists, Accessing List elements, looping in Lists, Basic List operations, Using built-in functions on Lists, List methods, Sorting and reversing.

UNIT 8: Tuples

Tuples, accessing tuple elements, looping in tuples, basic tuple operations, using built-in functions on Tuples, Tuple methods, Tuple varieties

UNIT 9: Sets

Definition of set, accessing set elements, looping in sets, basic set operations, Sets, Sets Methods and Functions

UNIT 10: Dictionaries

Dictionary, definition of dictionaries, accessing dictionary elements, looping in dictionaries, basic dictionary operations.

UNIT 11: Functions

Functions: Definition, call, positional and keyword parameter. Default parameters, variable number of arguments

UNIT 12: Modules

Modules: import mechanisms, Functional programming: map, filter, reduce, max, min. lambda function.

UNIT 13: Object Oriented Programming

Object Oriented Programming, Definition of Classes and Objects, Python Inheritance, Different types of Inheritance with examples.

UNIT 14: File Processing

File Processing: reading and writing files, manipulating file pointers using seek.

Unit 15: Python Libraries

Working with various libraries - NumPy, Pandas, Matplotlib, etc.

COURSE 03: DIGITAL MARKETING

Course Type:	Core
Number of Credits:	4
Total Marks:	100 (Formative: 30, Summative: 70)

Course Objectives:

- Understand the fundamental concepts, tools, and strategies of digital marketing, including SEO, social media marketing, analytics, and online advertising.

- Develop practical skills in keyword research, website planning, search engine optimization, and local business listing to improve online visibility.
- Gain hands-on knowledge of managing digital platforms such as social media channels, Google Analytics, e-commerce systems, and paid advertising tools.
- Build the ability to design, implement, and evaluate digital marketing campaigns using automation tools and performance metrics.

Course Outcome:

On completion of this course, the learners will be able to:

- Explain digital marketing concepts, tools, and techniques and differentiate them from traditional marketing approaches.
- Conduct keyword research, optimize websites for search engines, and enhance online presence using SEO and local business tools.
- Create and manage digital marketing campaigns across platforms such as social media, e-commerce websites, and Google advertising networks.
- Analyse marketing performance using analytics tools, automate marketing activities, and apply monetization strategies effectively and ethically.

Unit 1: Basics of Digital Marketing

Definition; Importance of Digital Marketing; working of digital marketing; advantages of digital marketing over traditional marketing; types of digital marketing

Unit 2: Keyword Research

Understanding keyword and its types; keyword research: tools for keyword research, localized keyword research; analysis of competitor website keyword; finalizing keyword for a project.

Unit 3: Website Planning

Importance of Domain name and domain extension; types of website: based on functionality and purpose; Planning of website design: content, plugin, engagement options; landing page and optimization.

Unit 4: Search Engine Optimization

Introduction to search engine and how it works; Concept of search engine optimization; Understanding the Search Engine Results Page; indexing; crawling

Unit 5: Social Media Marketing

Understanding social media and its marketing tools: paid marketing, organic marketing; Social Media optimization, Understanding marketing through Facebook, Instagram, YouTube, Google

Unit 6: Google mapping and Local Business

Listing of local in search engine; Image, video and Map setup in google places; visibility report of search engine and google reviews.

Unit 7: Google Analytics

Introduction and working of Google Analytics; Google analytics- account structure, insights, cookie training; setting up analytics account; how to add google analytics in website

Unit 8: WhatsApp Marketing

Understanding WhatsApp Marketing; WhatsApp push notification; WhatsApp Business; tools and settings in WhatsApp business; Limitations of WhatsApp

Unit 9: Facebook marketing

Introduction to Facebook-insights, algorithm; Understanding Facebook ads- organic and paid, targeting option; Facebook page management

Unit 10: X Marketing

Introduction to X Marketing; X marketing insights- dos and don'ts; Ad Content and targeting; fundamental of Influencer marketing; use of hashtags, tools

Unit 11: Instagram Marketing

Introduction to Instagram platform. Creation of Business page in Instagram; Marketing tools and Ads; Drive engagement and Lead generation; account switching

Unit 12: YouTube Marketing

Channel creation in YouTube; Uploading video and optimization; Video creation and story lineup; monetization of YouTube Channel; Case study

Unit 13: E-commerce marketing

E-commerce website and its advantages; marketing concept; Motivating shopping for online; affiliation marketing

Unit 14: Social Media Automation

Social Media automation- tools and process; Automatized report, analytics, best time to share; Rules related to automation

Unit 15: Google Ad Sense and AdWords

AdSense and process of earning through it; process of approval of AdSense; Placing Ads in website; AdWords and Ad placement; approval for AdWords; how to get Ads in Blog/YouTube.

COURSE 04: CYBER SECURITY

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objectives:

- Understand the fundamentals of cyberspace, internet architecture, and the core concepts and challenges of cyber security.
- Gain knowledge of various types of cyber crimes, cyber threats, social engineering attacks, and digital payment frauds along with their preventive measures.
- Develop awareness of cyber laws, IT Act 2000 provisions, regulatory frameworks, and legal remedies related to cyber security in India.
- Acquire practical knowledge of digital device security, Wi-Fi protection, social media safety, and best practices for secure online transactions and communication.

Course Outcome:

On completion of this course, the learners will be able to:

- Explain the structure of cyberspace, internet infrastructure, and the emerging trends and challenges in cyber security.
- Identify different types of cyber crimes, social engineering techniques, malware attacks, and digital payment frauds, and suggest appropriate preventive measures.
- Interpret relevant cyber laws, including the IT Act 2000 and RBI guidelines, and demonstrate awareness of reporting mechanisms and legal protections.
- Apply cyber security best practices to secure digital devices, Wi-Fi networks, social media platforms, and e-commerce transactions in real-life scenarios.

Unit 1: Introduction to Cyberspace

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology.

Unit 2: Introduction to Internet and Cyber Security

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.

Unit 3: Cyber Crime 1

Classification of cyber-crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children.

Unit 4: Cyber Crime 2

Financial frauds, Social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

Unit 5: Cyber Law

Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

Unit 6: Introduction to Social Media

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 networks.

Unit 7: Handling Social Media

Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social networks.

Unit 8: Security Issues in Social Media

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.

Unit 9: Introduction to E-Commerce

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E Commerce security best practices.

Unit 10: Introduction to Digital Payments

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), Aadhaar enabled payments.

Unit 11: Security Aspects in Digital Payments

Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007.

Unit 12: Digital Devices Security I

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software.

Unit 13: Digital Devices Security II

Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Antivirus.

Unit 14: Wi-Fi Security

Introduction to Wi-Fi, Types of Wireless security: Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA), Wi-Fi Protected Access 2 (WPA 2), Wi-Fi Protected Access 3 (WPA 3); Threats and risks to Wi-Fi Security, Ways to protect Wi-Fi network, Types of WiFi network security devices, Configuration of basic security policy and permissions

Unit 15: Latest Trends

Latest Cyber Security Trends, Reports Analysis, Attack Trends; Forbes Magazine etc.

COURSE 5: PRACTICAL

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Additional content or changes may be incorporated into the practical component as deemed necessary.

Practical Components of: AI-ASSISTED WEB PROGRAMMING

1. Compare AI-generated code vs manually written code (simple HTML page).
2. Install and configure VS Code with AI plugin (Copilot/Codeium).
3. Initialize Git repository and push code to GitHub.
4. Use AI to generate: A semantic HTML webpage, A student registration form, A table with sample data
5. Generate CSS using AI for: Card layout, Navigation bar, Responsive form
6. Generate JavaScript code using prompts: Form validation, Simple calculator, Loop-based number series
7. Create dynamic webpage: Add/remove elements dynamically; Use AI to improve event handling logic.
8. Use AI to scaffold a simple React app and create 2–3 components (Navbar, Card, Footer).
9. Create simple Node.js or Python server and build REST API with: GET and POST
10. Generate SQL queries using AI.
11. Use AI to identify and fix: Syntax errors and Logic errors; To detect performance improvements.
12. Use AI to generate deployment steps.

Practical Components of: AI-ASSISTED PYTHON PROGRAMMING

13. Install Python using Anaconda.
14. Create and run a simple program in: Jupyter Notebook, Google Colab, Spyder
15. Install an AI-assisted IDE (VS Code + Copilot/Codeium). Write a simple calculator: First manually and then using AI suggestions.
16. Use AI to generate a program using all operator types in one script.
17. Write a programs to: count vowels and consonants in a string, reverse a string, check if a string is palindrome, compare two strings, and convert string to uppercase/lowercase using methods.
18. Write programs to: Find largest of three numbers, Grade calculator using if-else, Menu-driven program using nested if.
19. Write programs to: Print multiplication table, Generate Fibonacci series, Check prime number, Factorial using while loop, Use break and continue in examples. And use AI to debug an infinite loop program.
20. Write programs to: Accept list from user and find: Maximum, Minimum, Sum
21. Write programs to: Create tuple and access elements and Convert list to tuple.

22. Write programs to: Perform union, intersection, and remove duplicates from list using set.
23. Write programs to: Create student dictionary (name, marks), Find student with highest marks, Count word frequency in sentence, Merge two dictionaries.
24. Write programs to: Create function for checking prime number and to calculate factorial of a number; Function with default arguments; Function with variable arguments; Recursive function example.
25. Write programs to: Create custom module and import it; Use math module. Use lambda with map, filter, reduce. And Find maximum and minimum using built-in functions.
26. Write programs to: Create class Student with attributes and methods; Demonstrate: Single inheritance, Multiple inheritance, Multilevel inheritance.
27. Write programs to: Write data to file; Read file content; Count words in file; Use seek() to move file pointer.
28. Write programs using: NumPy (To create arrays, Matrix addition and multiplication); Pandas (To create DataFrame, Read CSV file, Basic data analysis like mean, median etc.) Matplotlib (Plot: Line graph, Bar graph, Pie chart)
29. Compare own code with code generated through AI.

Practical Components of: DIGITAL MARKETING

30. Use tools like: Google Keyword Planner or Ubersuggest to identify: Short-tail keywords, Long-tail keywords, Local keywords and perform competitor keyword analysis.
31. Select domain name (theoretical planning) for website planning.
32. Perform On-page SEO: Meta title, Meta description, Image alt text.
33. Create business pages on: Facebook, Instagram.
34. Design 5 promotional posts using Canva. Write engaging captions with hashtags.
35. Create Google Analytics account. Add tracking code to demo website. Analyze: Users, Sessions, Traffic source.
36. Create WhatsApp Business profile. Set: Business hours, Catalog, Auto-replies
37. Create Facebook business page. Design mock ad campaign: Objective, Audience targeting, Budget planning.
38. Create X business profile. Write 5 promotional tweets. Use relevant hashtags.
39. Create Instagram business account. Design: 3 posts, 2 reels concept. Write captions and hashtag strategy.
40. Create YouTube channel. Upload 1 promotional video. Optimize: Title, Description, Tags. Create thumbnail. And Study monetization requirements.
41. Create Google Ads mock campaign: Keyword selection, Budget, Targeting. And analyze ad copy effectiveness.

Practical Components of: CYBER SECURITY

42. Prepare checklist for reporting cyber crime at Cyber crime Police Station.
43. Prepare checklist for reporting cyber crime online and reporting phishing emails.
44. Prepare basic checklist, privacy and security settings for popular Social media platforms.
45. Reporting and redressal mechanism for violations and misuse of Social media platforms.
46. Perform configuration of security settings in Mobile Wallets and UPIs.
47. Prepare checklist for secure net banking.

48. Perform setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
49. Do setting and configuring two factor authentication in the Mobile phone.
50. Perform security patch management and updates in Computer and Mobiles.
51. Manage Application permissions in Mobile phone.
52. Installation and configuration of computer Anti-virus.
53. Installation and configuration of Computer Host Firewall.
54. Check Wi-Fi security management in computer and mobile.