



Education through self-help is our motto- KARMAVEER

Rayat Shikshan Sanstha's
Dr. Patangrao Kadam Mahavidyalaya,
Ramanandnagar (Burli) Tal.Palus Dist. Sangli 416 308 (Maharashtra)
Affiliated Shivaji University, Kolhapur

Founder: Padmabhushan Dr. Karmaveer Bhaurao Patil (D.Litt)

•Email: ascc_magar@ymail.com •Website: www.asccramanandnagar.in
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I/C Principal Prof.Dr.U.V.Patil
M.A.,SET,Ph.D.

Department of BCA

(Under NEP 2.0)

as per AICTE Model Curriculum

2026-27

CO's PO's

Learning Outcomes, Program Outcome, Program Specific Outcome and Course Outcome

Learning Outcomes:

After successful completion of the BCA programme, students will be able to:

- Demonstrate fundamental knowledge of computer science, mathematics, programming, and information technology.
- Analyze computing problems and develop efficient software solutions using appropriate algorithms and data structures.
- Design, develop, test, and maintain software applications using modern programming languages and development tools.
- Apply database management concepts for efficient storage, retrieval, and management of data.
- Develop web-based, desktop, and mobile applications using current technologies and frameworks.
- Apply concepts of computer networks, operating systems, cybersecurity, and cloud computing in real-world applications.
- Utilize data science, artificial intelligence, machine learning, and big data techniques for intelligent decision-making.
- Use modern software tools, development environments, and emerging technologies effectively.
- Demonstrate effective communication, teamwork, leadership, ethical values, and professional responsibility.
- Engage in lifelong learning, research, innovation, entrepreneurship, and continuous professional development to meet industry and societal needs.

Programme Outcomes

- PO1:** Apply knowledge of mathematics, computing fundamentals, and programming to solve computer science problems.
- PO2:** Analyze computing problems and identify appropriate solutions using logical and analytical thinking.
- PO3:** Design, develop, and evaluate software applications to meet user requirements.
- PO4:** Conduct investigations using appropriate research methods, experimentation, and data analysis techniques.
- PO5:** Use modern programming languages, software tools, databases, AI tools, and development frameworks effectively.
- PO6:** Apply professional, ethical, legal, security, and social responsibilities in computing practices.
- PO7:** Understand the impact of computing solutions on society, environment, and sustainable development.
- PO8:** Function effectively as an individual and as a member or leader in multidisciplinary teams.
- PO9:** Communicate effectively through technical reports, presentations, documentation, and interpersonal interactions.
- PO10:** Apply project management principles and entrepreneurial skills in software development projects.
- PO11:** Demonstrate lifelong learning by adapting to emerging technologies and industry trends.
- PO12:** Develop secure, scalable, and efficient software systems using appropriate technologies.
- PO13:** Apply statistical, data analytical, and machine learning techniques for decision-making.
- PO14:** Design and manage database systems for real-world applications.
- PO15:** Apply networking concepts and cybersecurity practices to develop reliable computing systems.
- PO16:** Develop web and mobile applications using modern development frameworks.
- PO17:** Demonstrate leadership, teamwork, and professional ethics in organizational environments.
- PO18:** Utilize Artificial Intelligence, Data Science, and emerging technologies for innovative solutions.
- PO19:** Integrate interdisciplinary knowledge to solve complex real-world computing problems.
- PO20:** Successfully pursue higher education, research, entrepreneurship, or professional careers in computing.

Programme Specific Outcomes (PSOs)

PSO1: Apply programming concepts using C, Java, Python, PHP, C#, and .NET technologies.

PSO2: Design and develop database applications using SQL, PL/SQL, and modern DBMS tools.

PSO3: Develop responsive web applications using HTML, CSS, JavaScript, Bootstrap, ASP.NET, PHP, Angular, and Node.js.

PSO4: Apply software engineering principles throughout the Software Development Life Cycle (SDLC).

PSO5: Analyze, design, and optimize algorithms for efficient problem solving.

PSO6: Configure and manage computer networks while implementing network security techniques.

PSO7: Build data-driven applications using Python libraries such as NumPy, Pandas, and Matplotlib.

PSO8: Perform data visualization and reporting using Power BI and other visualization tools.

PSO9: Apply Machine Learning algorithms for classification, prediction, and data analysis.

PSO10: Implement Artificial Intelligence techniques including search algorithms, knowledge representation, and reasoning.

PSO11: Apply Data Science methodologies including data pre-processing, exploratory data analysis, and statistical modelling.

PSO12: Utilize Big Data technologies such as Hadoop, Spark, and NoSQL databases for large-scale data processing.

PSO13: Develop applications using cloud-ready, enterprise, and distributed computing technologies.

PSO14: Apply Generative AI and Prompt Engineering techniques for innovative software solutions.

PSO15: Develop secure software by implementing authentication, authorization, and cybersecurity best practices.

PSO16: Design, develop, test, deploy, and maintain industry-standard software projects.

PSO17: Demonstrate effective communication, leadership, teamwork, and project management skills in professional environments.

PSO18: Apply ethical principles, professional values, and legal standards in computing practices.

PSO19: Engage in research, innovation, and entrepreneurship using modern computing technologies.

PSO20: Continuously upgrade technical competencies through lifelong learning and adapt to emerging technologies in Computer Applications.

Course Outcome of BCA-I (Sem-I)

PROBLEM SOLVING TECHNIQUES (SEC101)

- CO1:** Understand basic terminology of computers, problem solving, programming Languages and their evolution (Understand)
- CO2:** Create specification from problem requirements by asking questions to disambiguate the requirement statement. (Create)
- CO3:** Design the solution from specification of a problem and write pseudo code of the algorithm using basic building blocks or structured programming constructs (Sequence, Selection and Repetition statement). (Create)
- CO4:** Translate an algorithm into a C computer program (Create)
- CO5:** Testing and analyzing programs using debugging tools. (Analyze)

COMPUTER ARCHITECTURE CC102

- CO6:** To Understand the basics of Digital Electronics and Binary Number System
- CO7:** To Learn the implementation of Combinational Circuit.
- CO8:** To Learn the implementation of Sequential Circuit.
- CO9:** To Understand the Organization of basic computers and concept of memory organization

GENERAL ENGLISH AEC102

- CO10:** Explain concept of Word Formation in English Language.
- CO11:** Illustrate use of phrases and clauses in sentences in English Language.
- CO12:** Identify common errors in English Writing.
- CO13:** Develop reading and listening, writing and speaking skills.

INDIAN VISION FOR HUMAN SOCIETY MDE 101

- CO14:** Explain the concept of “Vasudhaiva Kutumbkam” and its realization process as a base for the development of vision for a human society.
- CO15:** Identify the universality in humans and its coexistence in existence.
- CO16:** Demonstrate the sense of responsibility, duties, and participation of individual for establishment of fearless society.
- CO17:** Explain the apparently rational, verifiable and universal solution from ancient Indian knowledge system for the holistic development of physical, mental and spiritual wellbeing of one and all, at the level of individual, society, nation and ultimately the whole world.

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY VAC101

CO18: Explore the basic environmental concepts and issues relevant to the business and management field.

CO19: Recognize the interdependence between environmental processes and socioeconomic dynamics.

CO20: Determine the role of business decisions, policies, and actions in minimizing environmental degradation.

CO21: Identify possible solutions to curb environmental problems caused by managerial actions.

CO22: Develop skills to address immediate environmental concerns through changes in Business operations, policies, and decisions.

मराठी(MARATHI)-१ AEC103-I

CO23: मराठी भाषा व साहित्य अभ्यासाची अभिरुची निमाणाण होईल.

CO24: मराठी साहित्याचे आकलन विश्लेषण व समीक्षण करता येईल.

CO25: मराठी किवतेचे आस्वादन व मूल्य निणाय करता येईल.

CO26: वैचारिक व लिलत स्वरूपाचे लेखन करता येईल.

CO27: पत्रव्यवहाराचे कौशल्य अवगत होईल.

प्रयोजनमूलक हिंदी और कहताएँ AEC103-II

CO28: प्रयोजनमूलक हिंदी के प्रित छात्रों मे रुची बढाना ।

CO29: प्रयोजनमूलक हिंदी एवं उसकी उपयोगिता से छात्रों को परिचित कराना ।

CO30: काव्य एवं कहानी धिवा का आस्वाद विवेचन एवं महत्व समझाना ।

CO31: हिंदी किव एवं कहानीकारों तर्ा उनकी रचनाओं से परिचित कराना ।

CO32: साहित्य के माध्यम से नैतिक मूल्य राष्ट्र ाीय मूल्य एवं उत्तदायित्व के प्रित आस्रा निमाणाण करना ।

CO33: हिंदी भाषा के श्रवण,पठण, विचार ,कल्पना एवं लेखन क्षमता का छात्र मे विकास करना ।

संस्कृत (SANSKRIT)-I AEC103-III

CO34: वेदाणांचा परिचय करून देतात.

CO35: ऋग्वेदातील निवडक सूक्ााााांचा अभ्यास करतात.

CO36:सुसंस्कृतील सांकल् पना समजून घेतात

CO37:अगुननकतेच्या अनुषांगाने चे अवलोकन संस्कृतील करतात.

GERMAN-I AEC103-IV

CO38: Recognize basic grammar used in German Language

CO39: Demonstrate familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.

CO40: Execute himself /herself and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.

CO41: Debate and interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

CO42: Assess development in German language vocabulary by interacting with others

CO43: Construct presentation of how to use and scope of German Language.

BCA-I-Sem-II

MATHEMATICS FOUNDATIONS TO COMPUTER SCIENCE – II CC103

CO44: This course helps the students to understand correct lines of arguments and proofs.

CO45: This course introduces mathematical techniques that are foundations for understanding advanced computational methods, including numerical methods and optimization.

CO46: This course helps the students to understand various problem-solving strategies and methods to tackle both theoretical and practical challenges in computer science.

DATA STRUCTURES CC104

CO47: Understand the fundamental concepts of Data Structures and their applications.

CO48: Develop problem-solving skills using Data Structures.

CO49: Implement Data Structures using C programming language

OPERATING SYSTEMS CC105

CO50: Explain the fundamentals of the operating system.

CO51: Comprehend multithreaded programming, CPU scheduling, process management, process synchronization, memory, deadlocks, and storage management.

CO52: Compare the performance of CPU scheduling algorithms

CO53: Identify the features of I/O and File handling methods.

OBJECT ORIENTED PROGRAMMING USING JAVA - SEC102

CO54: To introduce the object oriented programming system concepts

CO55: To introduce syntax and semantics of Java programming language

CO56: To develop modular programs using Java

CO57: To setup JDK environment to create, debug and run Java programs

WEB TECHNOLOGIES SEC103

CO58: To understand the concepts and architecture of the World Wide Web, Markup languages along with Cascading Style Sheets.

CO59: To understand the concepts of event handling and data validation mechanisms.

CO60: To understand the concepts of embedded dynamic scripting on client side programming.

CO61: To develop modern interactive web applications

INDIAN CONSTITUTION VAC201

CO62: Explain concept of the Indian Constitution, particularly from the perspective of economic governance and business

CO63: Employ a nuanced analytical framework about ongoing constitutional debates and battles which affect the domain of business

CO64: Develop a sense of how questions of economic growth have to be balanced with other constitutional commitments, including social and economic justice.

मराठी (MARATHI)-2 उद्यम झेप-2 AEC103-I

CO65: मराठी भाषा व साहित्य अभ्यासाची अभिरुची निर्माण होईल .

CO66: मराठी साहित्याचे आकलन विश्लेषण व समीक्षण करता येईल.

CO67: मराठी किवतेचे आस्वादन व मूल्य निणाय करता येईल.

CO68: वैचारिक व लिलत स्वरूपाचे लेखन करता येईल .

CO69: पत्रव्यवहाराचे कौशल्य अवगत होईल.

(HINDI)-2

प्रयोजनमूलक हिंदी और कहानियाँ AEC103-II

- CO70:** प्रयोजनमूलक हिंदी के प्रित छात्रों मे रुची बढाना ।
- CO71:** प्रयोजनमूलक हिंदी एवं उसकी उपयोगिता से छात्रों को पररिचत कराना ।
- CO72:** काव्य एवं कहानी िधवा का आस्वाद िववेचन एवं महत्व समझाना ।
- CO73:** हिंदी कहानीकारों तर्ा उनकी रचनाओं से पररिचत कराना ।
- CO74:** साहित्य के माध्यम से नैतिक मूल्य राष्ट्र ाीय मूल्य एवं उत्तदाियत्व के प्रित आस्ा िनमााण करना ।
- CO75:** हिंदी भाषा के श्रवण ,पठण, िवचार ,कल्पना एवं लेखन क्षमता का छात्र मे िवकास करना

संस्कृत (SANSKRIT)-II AEC103-III

- CO76:** सांस्कृत ननतीसाधाीत्याचा पररचयकरून देतो.
- CO77:** धनतोदेशातील कर्ााााांचा पररचय करून देतो.
- CO78:** कर्ााााांमून धाोणाऱ्या नीतीबोिाचे नवश्लेषण धकतो.
- CO79:** चाणक्यनीनततील श्लोकाााांमून नीनतमूलाााााांचा अभ्यास धकतो.

GERMAN-II AEC103-IV

- CO80:** Recall everyday familiar expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Make use of the basic grammar concepts correctly
- CO81:** Demonstrate familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.
- CO82:** Execute himself /herself and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has.
- CO83:** Debate and interact in a simple way provided the other person talks slowly and clearly and is prepared to help.
- CO84:** Assess development in German language vocabulary by interacting with others
- CO85:** Construct presentation of how to use and scope of German Language.

JAPANESE-II

AEC103-V

- CO86:** Recognize basic grammar used in Japanese Language
- CO87:** Relate and demonstrate regional languages into Japanese language.
- CO88:** Experiment Japanese vocabulary in day-today speaking.
- CO89:** Debate and interact in a simple way with other persons.
- CO90:** Develop basic Japanese language skills (listening, speaking, writing, and reading).
- CO91:** Produce himself /herself with others and can ask and answer questions.

RUSSIAN-II AEC103-VI

- CO92:** Explain basic knowledge of Russian Language grammar.
- CO93:** Construct meaningful and grammatically correct sentences in Russian language.
- CO94:** Develop Russian Language skill (reading, writing, listening, speaking).
- CO95:** Investigate career opportunities in Foreign Languages.

BCA-II (SEM-III)

Probability and Statistics CC201

CO96: Understand measures of central tendency and dispersion.

CO97: Represent the statistical data in a systematic way to analyze and draw meaningful information from them.

CO98: Apply fundamental concepts of probability to analyze data and make informed decisions.

CO99: Formulate the hypothesis and use various tests for testing of hypothesis.

CO100: Apply correlation and regression techniques to study relationships between variables and predict outcomes.

CO101: Use statistical tools and software packages for data analysis, interpretation, and effective presentation of results.

Data Base Management System CC202

CO102: Understand Core Concepts of DBMS

CO103: Understand components of Database Design

CO104: Identify different database models

CO105: Demonstrate Database Design including forms and reports through MS-Access

CO106: Apply normalization techniques and functional dependencies to design efficient and consistent database structures.

CO107: Develop and manage relational databases using MS-Access through queries, forms, reports, and macros for real-life applications

Python Programming SEC201

CO108: Develop modular Python programs.

CO109: Apply suitable Python libraries to solve a given problem.

CO110: Understand basic Data visualization and File handling in Python.

CO111: Apply exception handling techniques to develop robust Python programs.

CO112: Perform file operations and manage data in text, CSV, and JSON formats efficiently.

CO113: Create meaningful 2D and 3D data visualizations using Python libraries to interpret and present data.

Software Engineering CC203

CO114: To Acquire a comprehensive understanding of the software development lifecycle and its application in contemporary software engineering practices.

CO115: To Develop proficiency in project management methodologies and strategic decision-making for successful software project execution.

CO116: To Master the art of software design, development, and testing to produce robust and efficient software solutions.

CO117: To understand the importance of quality management in software engineering for sustenance and reliability.

CO118: Apply software configuration management, version control, and release management techniques to ensure controlled and traceable software development.

CO119: Analyze and implement effective software testing strategies to enhance software reliability and maintainability.

Professional Elective I

Basics of Data Analytics using Spreadsheet DSE201.1

CO120: Understand the basics of MS Excel for data analytics and its applications.

CO121: To explore advanced Excel functions and data analytics tools.

CO122: Develop proficiency in using spreadsheet software for data manipulation and Analysis.

CO123: Build and use spreadsheet models for decision making & Communicate data insights effectively

CO124: Apply data cleaning, transformation, and pre-processing techniques to prepare datasets for analysis.

CO125: Analyze real-world datasets using Excel tools and derive actionable insights for decision-making in various domains.

Professional Elective I

Feature Engineering DSE201.2

CO126: Understand the importance of features in machine learning and differentiate between various types of data and features

CO127: Apply basic feature pre-processing techniques

CO128: Implement feature engineering techniques for numerical data and utilize categorical data techniques

CO129: Understand feature selection and feature transformation techniques with their applications

CO130: Apply dimensionality reduction techniques, such as PCA, to improve model performance and reduce computational complexity.

CO131: Evaluate and select relevant features to enhance the accuracy and efficiency of machine learning models.

Professional Elective I
Web Programming, I DSE201.3

CO132: Understand the fundamentals of HTML5 and CSS3.

CO133: Learn how to build web applications using HTML5, CSS3, and jQuery.

CO134: Develop skills in making responsive web site using bootstrap.

CO135: Explore features of jQuery to make interactive web applications

CO136: Implement responsive and visually appealing web pages using HTML5, CSS3, and Bootstrap components.

CO137: Utilize jQuery effectively to enhance user interaction and dynamic behaviour in web applications.

Yoga VAC201.1

CO138: Gain a comprehensive understanding of yoga and its modern applications for holistic well-being.

CO139: Demonstrate proficiency in yogic anatomy and physiology, enhancing yoga practice and promoting physical and energetic balance.

CO140: Master the Eight Limbs of Yoga and comprehend their psychological impact, fostering personal growth and self-realization.

CO141: Integrate yoga principles into sports and physical fitness activities to enhance performance and prevent injuries.

CO142: Develop skills in wellness management and nutrition.

Sports VAC201.2

CO143: Understand the fundamental principles and concepts of sports management, including its scope, organizational structure, and ethical considerations.

CO144: Analyse the role of marketing and sponsorship in the sports industry, with a focus on branding, target audience segmentation, and event management.

CO145: Develop proficiency in financial management techniques specific to the sports industry, including revenue generation, cost management, and investment strategies.

CO146: Explore the application of analytics and technology in sports, including performance evaluation, strategic decision-making, and fan engagement.

CO147: Apply theoretical knowledge to practical scenarios through case studies and projects, fostering critical thinking and problem-solving skills in sports management contexts.

NCC VAC201.3

CO148: Understand the foundational role of drill in fostering discipline and leadership within a group, enabling effective command towards achieving common goals.

CO149: Appreciate the importance of grace and dignity in executing foot drill movements, recognizing their significance in enhancing performance and teamwork.

CO150: Comprehend the criticality of weapon handling and detailed safety measures, emphasizing the importance of accident prevention through strict adherence to safety protocols.

CO151: Develop an awareness of diverse terrain types and their strategic significance in battle craft, enabling informed decision-making and effective utilization of terrain features for tactical advantage.

NSS VAC201.4

CO152: To provide students with an understanding of the history, philosophy, and basic concepts of the National Service Scheme (NSS).

CO153: To familiarize students with the aims, objectives, and organizational structure of NSS.

CO154: To equip students with knowledge about NSS programmes, activities, and their relevance.

CO155: To develop an understanding of community mobilization techniques and their importance in NSS activities.

CO156: To cultivate an appreciation for volunteerism, shramdan (voluntary labor), and their role in community development initiatives.

Disaster Management VAC201.5

CO157: To provide understanding of the concepts related to disaster

CO158: To highlight the importance and role of disaster management

CO159: To enhance awareness of institutional processes and management strategies to mitigate the impacts of disasters

Vivek Vahini VAC201.6

CO160: Enhancing scientific approach among students

CO161: Circulate Intellectualism and Conscience among students and Society.

CO162: Reducing discrimination based on race, gender and caste.

CO163: Creating an egalitarian approach among students

BCA-II SEMESTER (IV)

Relational Database Management System (RDBMS) CC204

CO164: Understand the Core Concepts of RDBMS

CO165: Demonstrate different types queries using Relational Database.

CO166: Apply advanced SQL queries, joins, and set operations to manipulate and retrieve data efficiently.

CO167: Develop and implement PL/SQL programs including cursors, triggers, stored procedures, and functions to automate database tasks.

Computer Networks CC205

CO168: Understand the fundamental concepts of Computer Networks and their applications.

CO169: Develop problem-solving skills related to network design, implementation, and Troubleshooting.

CO170: Implement network protocols and configure network devices

CO171: Identify the applications of Networking with its management

CO172: Analyse and implement network security measures, including firewalls, VPNs, and encryption techniques to protect network infrastructure.

CO173: Evaluate emerging networking technologies such as SDN, NFV, IoT, and 5G, and their impact on network design, management, and performance.

Design and Analysis of Algorithms CC206

CO174: To impart to students the understanding of basic algorithm designing paradigms.

CO175: Identify basic knowledge on how to analyse an algorithm.

CO176: To enable a student to synthesize efficient algorithms in common design situations and real-life problems.

CO178: Identify the limitations of algorithms in solving specific problems.

CO179: Apply advanced algorithmic paradigms such as backtracking, dynamic programming, and graph algorithms to solve complex problems efficiently.

CO180: Analyze computational intractability and classify problems into P, NP, NP-Complete, and NP-Hard to understand algorithm limitations.

Artificial Intelligence CC207

CO181: Understand the characteristics of rational agents, and the environment in which they operate, and gain insights about problem-solving agents.

CO182: Gain insights about Uninformed and Heuristic search techniques and apply them to solve search applications.

CO183: Obtain insights about the knowledge representation using Propositional logic, Predicate calculus and probabilistic reasoning through fuzzy logic.

CO184: Obtain a basic understanding of the AI domains and their applications and examine the legal and ethical issues of AI

CO186: Apply advanced AI techniques such as adversarial search, constraint satisfaction, and evolutionary algorithms to solve complex real-world problems.

CO187: Evaluate AI applications in various domains and assess their social, ethical, and legal implications.

Professional Elective – II

Data Visualization DSE202.1

CO188: Understand the role of Power BI in data visualization and its importance.

CO189: Explore the ethical considerations and challenges in data visualization.

CO190: Learn about visual perception and its impact on data interpretation.

CO191: Study different types of visualizations and their appropriate uses.

CO192: Design and develop interactive dashboards and reports using Power BI and other visualization tools to communicate insights effectively.

CO193: Apply principles of good visualization design, data modeling, and storytelling to present data clearly and ethically for decision-making.

Professional Elective–II

Introduction to ML DSE202.2

CO194: Define and explain machine learning concepts, types and types of Dataset. CO2: Implement and apply supervised and unsupervised learning techniques CO3: Develop and evaluate simple machine learning models

CO95: Analyze Neural Networks and apply appropriate machine learning algorithms depending on the problems with some real-world data

CO196: Apply performance evaluation metrics to assess and improve the accuracy of machine learning models.

CO197: Analyze and implement neural network models for practical problem-solving while considering ethical implications of AI and ML applications.

Professional Elective–II
Web Programming II DSE201.3

CO198: To Understand the fundamentals of PHP programming language.

CO199: To develop PHP applications using Error handling.

CO200: To design object-oriented programming (OOP) principles for PHP

CO201: To understand data abstraction using interfaces and abstract class.

CO202: Develop dynamic web applications using PHP by integrating arrays, functions, and object-oriented programming concepts.

CO203: Implement robust error handling, debugging, and logging mechanisms to ensure reliability and maintainability of PHP applications.

Design Thinking and Innovation SEC202

CO204: Understand design-based thinking approach to solve problems

CO205: Propose real-time innovative product designs and Choose appropriate frameworks, strategies, techniques during prototype development.

CO206: Understand the importance of prototyping.

CO207: Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products

CO208: Design prototype for solving problem

BCA-III (SEM-V)

Professional Elective (Data Science)

Introduction to Data Science-DSE 301

CO209: Explain the fundamental concepts, scope, lifecycle, and applications of Data Science.

CO210: Identify different types of data, data sources, and file formats used in Data Science.

CO211: Perform data acquisition, pre-processing, cleaning, transformation, and integration using appropriate techniques.

CO212: Apply descriptive statistics and Exploratory Data Analysis (EDA) techniques to understand and summarize datasets.

CO213: Use Data Science tools such as Excel, Python (Pandas, Matplotlib/Seaborn), and SQL for data analysis and visualization.

CO214: Understand the role of databases, big data concepts, data quality, and ethical issues such as privacy, security, and bias in Data Science.

Time Series Analysis-DSE302

CO215: Understand the concept, types, and components of Time Series data.

CO216: Analyze trends and seasonal variations using basic statistical methods.

CO217: Apply time series decomposition and simple forecasting techniques.

CO218: Interpret time-based data for decision-making in educational and business contexts.

CO219: Relate Time Series Analysis concepts to Data Analytics and Machine Learning applications.

Machine Learning-DSE303

CO220: To understand the domain of Machine Learning and the basic techniques used in ML.

CO221: To design and apply various machine learning algorithms for supervised learning.

CO222: To explore and apply supervised and unsupervised learning paradigms of Machine Learning.

CO223: To understand the techniques and real-world applications of Machine Learning.

CO224: To analyze and compare the performance of different Machine Learning algorithms for solving classification and regression problems.

CO225: To demonstrate the use of modern Machine Learning techniques and tools to solve real-world data-driven problems while understanding recent trends and ethical considerations.

Professional Elective (AI &ML) Course

Neural Network DSE301

CO226: To understand the fundamentals of Artificial Neural Networks (ANN).

CO227: To learn different neural network models and learning methods

CO228: To implement neural networks using Python

CO229: To apply neural networks for classification and prediction problems

Digital Image Processing -DSE302

CO230: Able to enhance the quality of an image using various transformations.

CO231: Analyze the transformation of an image from the spatial domain to the frequency domain.

CO232: Apply the required morphological operations to an image.

CO233: Segment an image using various image segmentation approaches.

CO234: Apply image enhancement, restoration, and compression techniques using appropriate spatial and frequency domain methods.

CO235: Analyze and solve basic digital image processing problems using image analysis techniques and understand their real-world applications.

Natural Language Processing-DSE303*

CO236: Understand the fundamental concepts, components, and applications of Natural Language Processing (NLP).

CO237: Analyze syntactic structures of natural language using various parsing techniques.

CO238: Apply semantic analysis, word sense disambiguation, and sentiment analysis methods for text processing.

CO239: Implement basic NLP applications using Python and the NLTK library.

CO240: Utilize Python libraries and big data tools such as NumPy, Pandas, PySpark, and Spark SQL for NLP and data analysis tasks.

CO241: Develop and evaluate simple NLP and machine learning models for solving real-world text analytics problems.

Professional Elective (Full Stack Devp.)

Advance Java-DSE301

CO242: Understand the concepts of JDBC, Servlets, and the Servlet life cycle.

CO243: Design and develop JSP applications using JSP scripting elements, tags, and MVC architecture.

CO244: Develop MVC-based Java web applications using Spring and Struts frameworks.

CO245: Apply Java technologies to develop web applications using JSF and Hibernate.

CO246: Build database-driven web applications using JDBC, Servlets, JSP, and Hibernate by implementing CRUD operations and session management.

CO247: Analyze and develop enterprise-level Java web applications using modern frameworks while following object-oriented programming principles and MVC architecture.

Dot Net Technology-DSE302*

CO248: Understand the fundamentals of the .NET Framework, .NET Core, C#, and ASP.NET architecture.

CO249: Develop Windows Forms and ASP.NET Web Forms applications using various controls and validation techniques.

CO250: Create web-based applications and reports using .NET technologies with database connectivity.

CO251: Implement database-driven ASP.NET applications using ADO.NET and SQL Server by performing CRUD operations.

CO252: Develop secure and user-friendly web applications by applying ASP.NET MVC concepts, authentication, authorization, and exception handling techniques.

CO253: Deploy ASP.NET web applications and understand the role of .NET Core and web services in modern application development.

Emerging Web Technology -DSE303

CO254: Develop Single Page Applications (SPAs) using AngularJS.

CO255: Build server-side applications using Node.js.

CO256: Design RESTful APIs using Express.js and MongoDB.

CO257: Implement authentication and deploy web applications.

CO258: Develop full-stack web applications using modern web technologies.

CO259: Apply security and deployment techniques in web application development.

Quantitative Techniques-SEC 301

CO260: Understand the fundamentals of quantitative aptitude.

CO261: Apply arithmetic, algebra, geometry, and number system concepts to solve problems.

CO262: Understand verbal reasoning and logical reasoning concepts.

CO263: Solve non-verbal reasoning and pattern-based problems.

CO264: Develop problem-solving and analytical thinking skills for competitive examinations.

CO265: Solve aptitude and reasoning questions for competitive exams, entrance tests, and interviews.

Internship Project-SEC 302

CO266: Apply structured methodologies to design, code, test, and deploy a fully functional software product.

CO267: 2. Construct and manage databases using SQL queries, ER modelling, and normalization techniques to meet specific project needs.

CO268: 3. Identify, analyse, and research new technologies, frameworks, or tools to solve specific project challenges.

CO269: 4. Prepare detailed technical reports, requirement specifications, user manuals, and project documentation.

B.C.A Part-III (Sem-VI)

Generative AI -CC301

CO270: Understand the fundamentals of Generative AI and machine learning.

CO271: Explain major Generative AI models and techniques.

CO272: Apply prompt engineering for content generation.

CO273: Use Generative AI tools for text, image, and data analysis.

CO274: Explore real-world applications of Generative AI in different domains.

Entrepreneurship and Start-up Ecosystem-CC302

CO275: Identify entrepreneurial opportunities and startup ideas.

CO276: Explain startup ecosystems, funding sources, and legal frameworks.

CO277: Apply business models and design thinking for technology-based startups.

CO278: Understand digital business models and emerging technologies in entrepreneurship.

CO279: Develop a basic startup plan using appropriate entrepreneurial tools.

Professional Elective (Data Science)

Big Data Analytics-DSE 304

CO280: Understand core concepts of Big Data.

CO281: Describe and implement Hadoop ecosystem tools (HDFS, MapReduce, Hive, Pig).

CO282: Compare NoSQL models and perform basic operations using Cassandra.

CO283: Apply Python and Apache Spark tools (NumPy, Pandas, PySpark, MLlib) for Big Data Analytics and basic machine learning tasks.

CO284: Analyze and process structured, semi-structured, and unstructured data using Big Data technologies.

CO285: Develop basic Big Data analytics solutions using Hadoop, NoSQL, Python, and Spark for real-world applications.

Exploratory Data Analysis -DSE 305

CO286: Create and manipulate NumPy arrays to perform data analysis.

CO287: Use Pandas methods to import, export, and preprocess data from various sources.

CO288: Perform data cleaning, filtering, sorting, reshaping, and merging using Pandas.

CO289: Analyze and visualize data using grouping, aggregation, and Matplotlib functions.

CO290: Apply Exploratory Data Analysis (EDA) techniques to summarize and interpret datasets.

CO291: Develop data analysis and visualization solutions using NumPy, Pandas, and Matplotlib for real-world datasets.

Professional Elective (AI &ML)

Deep Learning for Computer Vision-DSE 304

CO292: Implement basic image processing operations.

CO293: Understand the basic concepts of deep learning.

CO294: Design and implement CNN, RNN, and deep generative models.

CO295: Understand the role of deep learning in computer vision applications.

CO296: Apply deep learning techniques for image classification, segmentation, and feature extraction.

CO297: Analyze and implement deep generative models for real-world computer vision applications.

Predictive Analysis -DSE305

CO298: Describe logic building for problem solving.

CO299: Identify the chi-squared statistical test.

CO300: Apply model maintenance techniques to prevent model deterioration.

CO301: Appraise new independent variables for predictive modelling.

CO302: Develop and evaluate predictive models using statistical and analytical methods for real-world decision making.

Professional Elective (Full Stack Devp.)

Web Content Management -DSE 304

CO303: Understand the concepts, architecture, and applications of Web Content Management Systems (CMS).

CO304: Manage different types of web content and the content publishing lifecycle.

CO305: Develop and maintain websites using open-source CMS platforms such as WordPress, Joomla, and Drupal.

CO306: Apply CMS features including themes, plugins, user roles, media management, and website customization.

CO307: Implement CMS security, performance optimization, SEO, and website maintenance techniques.

Web Application Security -DSE305

CO308: Understand the concepts of Web Security

CO309: Understand the Web architecture and applications

CO310: Understand how common mistakes can be bypassed and exploit the applications

CO311: Identify common web application vulnerabilities and their mitigation .

Soft Skills-DSE305

CO312: Understand the importance of soft skills and professional ethics.

CO313: Develop effective communication, teamwork, and leadership skills.

CO314: Enhance personality through self-awareness, SWOT analysis, and confidence building.

CO315: Demonstrate professional etiquette, interpersonal skills, and time management.

CO316: Prepare for group discussions, resume writing, and personal interviews with confidence.

Major Project -SEC303/SEC304

CO317: Demonstrate practical application of programming and software development skills

CO318: Integrate knowledge from subjects like DBMS, Networking, Software Engineering, Web Development, etc.

CO319: Develop problem-solving and system design abilities.

CO320: Prepare students for industry-level development practices

ABBREVIATIONS

GUI- graphical user interface.

SQL- Structured Query Language.

DDL- Data Definition Language.

DML- Data Manipulation Language.

DBMS- Database Management System.

OS- Operating System.

FIFO- First In, First Out.

LIFO- Last In Last Out.



Head of Dept.
Department of BCA
Dr. Patangrao Kadam Mahavidyalaya,
Ramanandnagar (Burli)



Principal
Dr. Patangrao Kadam Mahavidyalaya,
Ramanandnagar (Burli)