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*Programme Specific Outcomes (PSO) and Course Outcomes (CO)*

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Department Name : Department of Computer Applications

Programme Name : Bachelor of Computer Application (BCA)

### Programme Specific Outcomes (PSO)

PSO1: Apply mathematical foundations, algorithmic principles, and computer science theory and principles to provide software solutions.

PSO2: Design, implement and test a software system keeping ethical and professional standards.

PSO3: Learn to integrate new design methodologies and development platforms.

PSO4: Practice teamwork on projects in diverse professional environments.

PSO5: Demonstrate oral and written communication skills.

### Course Outcomes (CO)

Course Code	Course Name	Course Outcomes
UCE1801	<b>Essential English for Under Graduates</b>	<b>COUCE1801.01:</b> Identify the distinct sounds in English words <b>COUCE1801.02:</b> Articulate words and sentences clearly stressing the right syllables. <b>COUCE1801.03:</b> Choose the right words while writing/talking about everyday life. <b>COUCE1801.04:</b> Write sentences adhering to tense rules <b>COUCE1801.05:</b> Correct common errors such as punctuation and capitalization <b>COUCE1801.06:</b> Use expressions appropriate for various social occasions <b>COUCE1801.07:</b> Identify the key points in a piece of writing:
UBC1801	<b>Algebra and Logic (Complementary)</b>	<b>COUBC1801.01:</b> Write an argument using logical notation and determine if the argument is valid or not. <b>COUBC1801.02:</b> Demonstrate the ability to write a proof or outline the basic structure using different method of proofs.

		<p><b>COUBC1801.03:</b> Test the validity of the given propositions.</p> <p><b>COUBC1801.04:</b> Solve system of linear equations using canonical matrix, inverse matrix method and Cramer's rule.</p> <p><b>COUBC1801.05:</b> Compute determinant, characteristic equation, Eigen values and Eigen vectors of a square matrix.</p> <p><b>COUBC1801.06:</b> Manipulate matrices and to do matrix algebra.</p>
<b>UBC1802</b>	<b>Basic Statistics (Complementary)</b>	<p><b>COUCE1802.01:</b> Collect and present data objectively.</p> <p><b>COUCE1802.02:</b> Calculate different measures of central tendency and dispersion.</p> <p><b>COUCE1802.03:</b> Solve problems of permutations and combinations.</p> <p><b>COUCE1802.04:</b> Study different approaches of probability.</p> <p><b>COUCE1802.05:</b> Find the probability distribution function, expectation, variance and moments of random variables.</p>
<b>UBC1803</b>	<b>Fundamentals of Computers and Digital Systems (Core)</b>	<p><b>COUBC1803.01:</b> Understand the basic components of the computer system, software categories and ethical aspects of using computers.</p> <p><b>COUBC1803.02:</b> Design logic circuits using simplified Boolean Expression.</p> <p><b>COUBC1803.03:</b> Comprehend the design of Adders, Encoders, Multiplexer, Decoder and De-Multiplexer.</p> <p><b>COUBC1803.04:</b> Recognize the design of Flip-flops, Registers and Counters.</p> <p><b>COUBC1803.05:</b> Acquire basic concepts of primary and secondary memory.</p>
<b>UBC1804</b>	<b>Introduction to Programming in C (Core)</b>	<p><b>COUBC1804.01:</b> Acquire the basics of programming and C Language.</p> <p><b>COUBC1804.02:</b> Apply loops and decision control statements in problem solving.</p> <p><b>COUBC1804.03:</b> Implement various operations on single and multidimensional arrays.</p> <p><b>COUBC1804.04:</b> Develop programs using pointers and user defined functions.</p> <p><b>COUBC1804.05:</b> Design programs using user defined data types in C.</p>
<b>UBC1805</b>	<b>Software Lab I</b>	<p><b>COUBC1805.01:</b> Develop algorithms and logical skill for problem solving.</p> <p><b>COUBC1805.02:</b> Perform various phases of C program development.</p> <p><b>COUBC1805.03:</b> Apply appropriate programming language construct for solving complex problems.</p> <p><b>COUBC1805.04:</b> Familiarize with structured programming concepts.</p>

<b>UBC1806</b>	<b>Office Automation Tools ( Non-Credit Course)</b>	<b>COUBC1806.01:</b> Acquire Basic skills in word processing. <b>COUBC1806.02:</b> Create slide presentation using Text, Graphics and Animations.
<b>UCE1802</b>	<b>Academic and Professional English (Common)</b>	<b>COUCE1802.01:</b> Identify the elements of good academic writing <b>COUCE1802.02:</b> Select the right vocabulary for an academic essay. <b>COUCE1802.03:</b> Write effective thesis statements <b>COUCE1802.04:</b> Identify the different strategies employed in shaping an academic essay <b>COUCE1802.05:</b> Write brief book reviews <b>COUCE1802.06:</b> Write CVs and cover letters
<b>UBC1807</b>	<b>Discrete Mathematics (Complementary)</b>	<b>COUBC1807.01:</b> Prove basic set equalities using truth table and definitions. <b>COUBC1807.02:</b> Determine the properties of relations and functions. <b>COUBC1807.03:</b> Solve mathematical problems using permutation, Combination and Principle of inclusion and exclusion. <b>COUBC1807.04:</b> Find minimal spanning tree of a connected graphs <b>COUBC1807.05:</b> Verify the planarity of a given graph <b>COUBC1807.06:</b> Identify shortest paths for connected graphs
<b>UBC1808</b>	<b>Computer Architecture and Microprocessor (Core)</b>	<b>COUBC1808.01:</b> Understand the functionality and features of CPU. <b>COUBC1808.02:</b> Analyze the various methods and techniques used in memory organization. <b>COUBC1808.03:</b> Identify the components of a motherboard. <b>COUBC1808.04:</b> Analyze the purpose of low level and high level disk formatting. <b>COUBC1808.05:</b> Understand the architecture, instruction set and addressing modes of 8085 microprocessor.
<b>UBC1809</b>	<b>Database Management System (Core)</b>	<b>COUBC1809.01:</b> Understand DBMS concepts, data models, Architecture and ER model. <b>COUBC1809.02:</b> Demonstrate relational data model. <b>COUBC1809.03:</b> Use SQL for database management. <b>COUBC1809.04:</b> Learn in detail the normalization process and Indexing of files. <b>COUBC1809.05:</b> Understand fundamental concepts of transaction processing, concurrency control techniques and database security.
<b>UBC1810</b>	<b>Data Structures (Core)</b>	<b>COUBC1810.01:</b> Learn fundamental concepts of static and dynamic Data structures. <b>COUBC1810.02:</b> Compare and Contrast different searching and

		<p>sorting techniques.</p> <p><b>COUBC1810.03:</b> Design operations on linear data structures such as stacks and queues.</p> <p><b>COUBC1810.04:</b> Implement operations on linked lists.</p> <p><b>COUBC1810.05:</b> Devise programs for operations on trees.</p>
<b>UBC1811</b>	<b>SOFTWARE LAB II</b>	<p><b>COUBC1811.01:</b> Develop programs in C to implement various sorting and searching methods.</p> <p><b>COUBC1811.02:</b> Implement programs in C to solve problems using different data structures.</p> <p><b>COUBC1811.03:</b> Query a database using SQL DML/ DDL commands.</p> <p><b>COUBC1811.04:</b> Enforce integrity constraints on a database using SQL.</p>
<b>UBC1812</b>	<b>IOT and Spreadsheet tool (Non-Credit)</b>	<p><b>COUBC1812.01:</b> Understand the basics of spread sheet and its formatting techniques.</p> <p><b>COUBC 1812.02:</b> Apply formulas and functions to manipulate, manage and analyse data using spread sheet.</p> <p><b>COUBC 1812.03:</b> Prepare different types of Charts to represent data.</p> <p><b>COUBC 1812.04:</b> Understand the basics of IOT.</p>
<b>UBC1813</b>	<b>Advanced Statistical Methods (Complementary)</b>	<p><b>COUBC1813.01:</b> Differentiate various probability distributions.</p> <p><b>COUBC1813.02:</b> Define the statement of central limit theorem.</p> <p><b>COUBC1813.03:</b> Recognize the sampling distributions.</p> <p><b>COUBC1813.04:</b> Understand the concept of estimation.</p> <p><b>COUBC1813.05:</b> Test statistical hypotheses.</p> <p><b>COUBC1813.06:</b> Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.</p>
<b>UBC1814</b>	<b>Software Engineering (Core)</b>	<p><b>COUBC1814.01:</b> Model a software system using one or more design construct.</p> <p><b>COUBC1814.02:</b> Understand the basics of Software engineering and Life cycle models.</p> <p><b>COUBC1814.03:</b> Understand Software requirement analysis process.</p> <p><b>COUBC1814.04:</b> Contribute in the design and development of projects using software engineering techniques.</p> <p><b>COUBC1814.05:</b> Describe Software Reliability</p>
<b>UBC1815</b>	<b>Computer Graphics (Core)</b>	<p><b>COUBC1815.01:</b> Understand hardware and software components of graphics systems and application areas of computer graphics.</p> <p><b>COUBC1815.02:</b> Apply fundamental algorithms to generate lines and circles.</p> <p><b>COUBC1815.03:</b> Implement 2D geometric transformations and viewing algorithms.</p> <p><b>COUBC1815.04:</b> Understand various 3D display methods and</p>

		<p>object Representation techniques.</p> <p><b>COUBC1815.05:</b> Acquire the basic concepts of computer animations.</p>
<b>UBC1816</b>	<b>Design and Analysis of Algorithms (Core)</b>	<p><b>COUBC1816.01:</b> Analyze the asymptotic performance of algorithms.</p> <p><b>COUBC1816.02:</b> Device correctness proofs for algorithms.</p> <p><b>COUBC1816.03:</b> Identify appropriate data structures for algorithmic solutions.</p> <p><b>COUBC1816.04:</b> Apply important algorithmic design paradigms and methods of analysis.</p> <p><b>COUBC1816.05:</b> Synthesize efficient algorithms for classical mathematical problems.</p>
<b>UBC1817</b>	<b>Object Oriented Programming in C++ (Core)</b>	<p><b>COUBC1817.01:</b> Describe Programming Paradigms</p> <p><b>COUBC1817.02:</b> Define Classes and objects</p> <p><b>COUBC1817.03:</b> Use functions in C++ programming.</p> <p><b>COUBC1817.04:</b> Apply inheritance in programming</p> <p><b>COUBC1817.05:</b> Understand the concept of pointers and virtual functions in C++ programming.</p>
<b>UBC1818</b>	<b>Software Lab- III (Core)</b>	<p><b>COUBC1818.01:</b> Create Class and Objects in C++.</p> <p><b>COUBC1818.02:</b> Implement Inheritance, Polymorphism and object relationship in C++.</p> <p><b>COUBC1818.03:</b> Implement the concept of pointers and virtual functions in C++.</p>
<b>UBC1819</b>	<b>Entrepreneurship and Innovations(Non-Credit)</b>	<p><b>COUBC1819.01:</b> Describe the concept of Entrepreneurship.</p> <p><b>COUBC1819.02:</b> Develop Entrepreneurship talents.</p> <p><b>COUBC1819.03:</b> Identify innovative business ideas.</p> <p><b>COUBC1819.04:</b> Recognize Government initiatives to support Entrepreneurship.</p> <p><b>COUBC1819.05:</b> Develop a business plan.</p>
<b>UBC1820</b>	<b>Operations Research (Core)</b>	<p><b>COUBC1820.01:</b> Understand the significance of OR in Management and Industry.</p> <p><b>COUBC1820.02:</b> Convert real life situations to mathematical models in LPP.</p> <p><b>COUBC1820.03:</b> Solve Linear programming problem by using graphical method and algebraic method.</p> <p><b>COUBC1820.04:</b> Solve transportation problem and assignment problem.</p> <p><b>COUBC1820.05:</b> Understand concept of Game theory.</p> <p><b>COUBC1820.06:</b> Solve pure strategy Games.</p> <p><b>COUBC1820.07:</b> Solve mixed strategy problems by principle of dominance.</p>
<b>UBC1821</b>	<b>Operating Systems (Core)</b>	<p><b>COUBC1821.01:</b> Acquire the basic understanding of Operating system.</p>

		<p><b>COUBC1821.02:</b> Understand the concepts of process and various process Scheduling Algorithms.</p> <p><b>COUBC1821.03:</b> Appraise the design of various algorithms for process Synchronization and deadlock handling.</p> <p><b>COUBC1821.04:</b> Analyze various memory management techniques.</p> <p><b>COUBC1821.05:</b> Master issues related to file system interface and implementation.</p>
<b>UBC1822</b>	<b>Web Programming using PHP (Core)</b>	<p><b>COUBC1822.01:</b> Understand basics of WWW and web page design using HTML.</p> <p><b>COUBC1822.02:</b> Apply CSS and JavaScript in web programming</p> <p><b>COUBC1822.03:</b> Understand the basic program constructs in PHP</p> <p><b>COUBC1822.04:</b> Apply function, sessions, cookies and Object Oriented concepts of PHP in Web programming</p> <p><b>COUBC1822.05:</b> Implement basic SQL programming in PHP</p>
<b>UBC1823</b>	<b>Software Testing and Quality Assurance (Core)</b>	<p><b>COUBC1823.01:</b> Summarize the fundamentals of software testing and process models.</p> <p><b>COUBC1823.02:</b> Discuss various levels and types of testing.</p> <p><b>COUBC1823.03:</b> Understand the organization structure of a testing team and ethics in testing.</p> <p><b>COUBC1823.04:</b> Describe the test management activities.</p> <p><b>COUBC1823.05:</b> Familiarize a test automation tool.</p>
<b>UBC1824</b>	<b>Introduction to Python (Core)</b>	<p><b>COUBC1824.01:</b> Learn Python programming Environment and basic design constructs.</p> <p><b>COUBC1824.02:</b> Understand the decision and repetition structures in program design.</p> <p><b>COUBC1824.03:</b> Apply functions and files to improve the efficiency of the programs.</p> <p><b>COUBC1824.04:</b> Implement exception handling and Object-oriented programming methodology.</p> <p><b>COUBC1824.05:</b> Represent and visualize data.</p>
<b>UBC1825</b>	<b>Software Lab- IV (Core)</b>	<p><b>COUBC1825.01:</b> Create web pages using HTML, DHTML and Cascading styles sheets.</p> <p><b>COUBC1825.02:</b> Create dynamic web pages using JavaScript (client side programming).</p> <p><b>COUBC1825.03:</b> Build web applications using PHP.</p> <p><b>COUBC1825.04:</b> Familiarize the basics of python programming.</p>
<b>UBC1826</b>	<b>Business Idea Development OR Web Site Development (Non Credit)</b>	<p>COUBC1826.01: Develop a web site.</p> <p>COUBC1826.02: Perform Client side validations in Web sites.</p>
<b>UBC1827</b>	<b>Computer</b>	<b>COUBC1827.01:</b> Understand the terminology and concepts of OSI

	<b>Networks (Core)</b>	<p>and TCP-IP reference models.</p> <p><b>COUBC1827.02:</b> Identify the various multiplexing techniques and routing mechanisms.</p> <p><b>COUBC1827.03:</b> Compare and contrast the various error detection and correction techniques for data transmission.</p> <p><b>COUBC1827.04:</b> Acquire the concept of multiple access protocols and wireless networks.</p> <p><b>COUBC1827.05:</b> Describe the various IP addressing methods and congestion control techniques in networking.</p>
<b>UCN1801</b>	<b>Environmental Studies and Human Rights (Core)</b>	<p><b>COUCN1801.01:</b> Students recognize that our life-support system is maintained by all the species that make-up the bio-sphere, so that they are prepared to sustain biodiversity at all costs.</p> <p><b>COUCN1801.02:</b> They develop observation skills and critical thinking and apply them to the analysis of a problem-infested environment.</p> <p><b>COUCN1801.03:</b> They analyze the principles of ecology and the environmental damage to life-supportive elements such as air, land and water on a global scale.</p> <p><b>COUCN1801.04:</b> They develop a plan to counteract the overall impact of a specific issue, whether local or global, sketching out an effective environment management plan.</p> <p><b>COUCN1801.05:</b> They develop empathy and respect for human rights and their application in Indian context.</p>
<b>UBC1828</b>	<b>JAVA PROGRAMMING (Core)</b>	<p><b>COUBC1828.01:</b> Create basic Java programs without using objects.</p> <p><b>COUBC1828.02:</b> Develop programs using Object Oriented Programming concepts</p> <p><b>COUBC1828.03:</b> Integrate exception handling techniques and multithreaded programs.</p> <p><b>COUBC1828.04:</b> Implementation of GUI in window applications.</p> <p><b>COUBC1828.05:</b> Demonstrate java applets in web pages and swings in GUI.</p>
<b>UBC1829</b>	<b>Open Course (Core) - Internet, Web Designing and Cyber Laws</b>	<p><b>COUBC1829.01:</b> Understand the basic concepts and underlying technologies of Internet.</p> <p><b>COUBC1829.02:</b> Discuss the various services provided by Internet.</p> <p><b>COUBC1829.03:</b> Analyze the facilities for secure communication and E-Commerce business.</p> <p><b>COUBC1829.04:</b> Develop web pages using HTML.</p>

		<b>COUBC1829.05: Understand the various Cyber Crimes and Cyber Laws.</b>
<b>UBC1830</b>	<b>Software Lab V</b>	<p><b>COUBC1830.01:</b> Implement the Object Oriented Programming concepts.</p> <p><b>COUBC1830.02:</b> Create packages and interfaces using java program.</p> <p><b>COUBC1830.03:</b> Implement Exception Handling in java.</p> <p><b>COUBC1830.04:</b> Implement AWT, swings and Event Handling in java.</p> <p><b>COUBC1830.05:</b> Develop and deploy Applet in java</p>
<b>UBC1831</b>	<b>Software Development Lab I (Core)</b>	<p><b>COUBC1831.01:</b> Apply Software Engineering concepts in project development.</p> <p><b>COUBC1831.02:</b> Plan, analyze, design and implement a web project using PHP and MySQL.</p> <p><b>COUBC1831.03:</b> Demonstrate independent learning.</p> <p><b>COUBC1831.04:</b> Demonstrate and document software product.</p>
<b>UBC1832</b>	<b>Linux Operating System (Core)</b>	<p><b>COUBC1832.01:</b> Apply the basic set of commands and utilities of Linux system.</p> <p><b>COUBC1832.02:</b> Write Shell Scripts for Linux systems.</p> <p><b>COUBC1832.03:</b> Use Linux process scheduling functions.</p> <p><b>COUBC1832.04:</b> Describe the inner structure of Linux.</p> <p><b>COUBC1832.05:</b> Use Linux filter commands in scripts.</p>
<b>UBC1833</b>	<b>Mobile Computing and Android Application Development(Core)</b>	<p><b>COUBC1833.01:</b> Understand various techniques for developing mobile applications.</p> <p><b>COUBC1833.02:</b> Design a User interface for mobile devices.</p> <p><b>COUBC1833.03:</b> Implement activity and multimedia in Android</p> <p><b>COUBC1833.04:</b> Apply SQLite Database in Android</p> <p><b>COUBC1833.05:</b> Use JSON and XML in Mobile application development</p>
<b>UBC1834A</b>	<b>Cloud Computing (Core)</b>	<p><b>COUBC1834A.01:</b> Understand the basics of Cloud computing and evolution of cloud as a technology.</p> <p><b>COUBC1834A.02:</b> Summarize various types of cloud offerings and governance models.</p> <p><b>COUBC1834A.03:</b> Discuss various aspects related to the consumability of cloud solutions by a business establishment.</p> <p><b>COUBC1834A.04:</b> Understand high level architechure of implementing cloud solutions with a focus on the security aspects.</p> <p><b>COUBC1834A.05:</b> Create business and market awareness about cloud computing. Understand various techniques for developing mobile applications.</p>
<b>UBC1834B</b>	<b>Data Mining</b>	<b>COUBC1834B.01:</b> Understand Operational database and warehousing

		<p><b>COUBC1834B.02:</b> Identify data extraction and transformation techniques.</p> <p><b>COUBC1834B.03:</b> Gain knowledge about classification and prediction , different cluster analysis techniques.</p>
<b>UBC1834C</b>	<b>Image Processing</b>	<p><b>COUBC1834C.01:</b> Recognize features of Digital Images.</p> <p><b>COUBC1834C.02:</b> Understand Image enhancement in spatial an Frequency Domain.</p> <p><b>COUBC1834C.03:</b> Introduce basic morphological features.</p> <p><b>COUBC1834C.04:</b> Identify Image segmentation features.</p>
<b>UBC1835</b>	<b>Software Lab VI &amp; Seminar (Core)</b>	<p><b>COUBC1835.01:</b> Use the fundamental LINUX system tools and utilities.</p> <p><b>COUBC1835.02:</b> Develop LINUX shell programs.</p> <p><b>COUBC1835.03:</b> Create Android Apps using SQLite [2].</p> <p><b>Seminar</b></p> <p><b>COUBC1835.01:</b> Conduct Literature Survey.</p> <p><b>COUBC1835.02:</b> Develop presentation and communication skill.</p> <p><b>COUBC1835.03:</b> Build confidence for public speaking.</p> <p><b>COUBC1835.04:</b> Familiarize new developments in IT.</p>
<b>UBC1836</b>	<b>Software Development Lab II (Main Project)</b>	<p><b>COUBC1836.01:</b> Understand software engineering principles and develop an ability to apply them to software design of real life problems in an industry/ commercial environment.</p> <p><b>COUBC1836.02:</b> Plan, analyze, design and implement a software project.</p> <p><b>COUBC1836.03:</b>Demonstrate independent learning.</p> <p><b>COUBC1836.04:</b>Demonstrate the ability to locate and use technical information from multiple sources.</p> <p><b>COUBC1836.05:</b> Understand professional ethics in Software development.</p> <p><b>COUBC1836.06:</b>Demonstrate communication skill.</p>