



Department of Computer Science Tarakeswar Degree College

Program outcomes/program specific outcomes/course outcomes

Department of Computer Science, Tarakeswar Degree College, offers 3 years **undergraduate (honours/General)** courses in Computer Science in accordance to the prescribed **CBCS curriculum of Burdwan University**. Generic course in Computer Science is offered for students of other departments and B.Sc. Program in Computer Science is also offered at the undergraduate level.

This department provides 14 Core Courses (CC papers), 4 Discipline Specific Elective (DSE papers) and 2 Skill Enhancement Course (SEC) for Semester-I to VI undergraduate B.Sc. Honours students. Beside that 4 General Electives (GE papers) also offers to other disciplines.

This department offers 4 Core Courses (CC papers), 2 Discipline Specific Elective (DSE papers) and 4 Skill Enhancement Course (SEC papers) for Semester-I to VI undergraduate B.Sc. General students.

The undergraduate honours/general course in Computer Science is intended to introduce the fundamental aspects of all branches of Computer Science to the students. Students learn about different area of computer science in this three year degree course, which enables them to identify their area of keen interest and hence provides the basic foundation of their higher studies and IT industry. They develop computer laboratory skills, critical thinking and reasoning to address different aspects of computer science.

PROGRAM OUTCOMES POs:

B.Sc (Hons/Gen) Graduates will be able to:

- PO1.** Enable Graduates to develop logics which will help them to create programs using computer languages.
- PO2.** Ensure Graduates with acquired skills and enhanced knowledge will be employable / become entrepreneurs or will pursue higher Education.

- PO3.** Graduates with acquired knowledge of modern software tools will be able to contribute effectively as software engineers.
- PO4.** Graduates will be able to comprehend the related concepts to Computer Science with Allied papers.
- PO5.** Graduates will be imbued with ethical values and social concerns to ensure peaceful society.
- PO6.** Graduates will be able to comprehend the basic concepts learnt and apply in real life situations with analytical skills.

PROGRAM SPECIFIC OBJECTIVES (PSOs) :

- PSO1.** To analyze, design and develop computing solutions by applying foundational concepts of Computer Science.
- PSO2.** To apply software engineering principles and practices for developing quality software for scientific and business applications.
- PSO3.** To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Course Outcomes of UG Honours Course

Semester-I

| Course code | Course Title | Course Outcomes |
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| CC-1 | Programming Fundamentals using C / C++ | A student should be able to use: <ul style="list-style-type: none"> CO1. The basic concepts of programming structure and its syntax CO2. The various types of arrays, its structure, types of Functions and String handling mechanisms. CO3. The Concepts of structures, Union, Pointers and File handling in C/C++. CO4. Standard input/output and file input/output operations. CO5. Object oriented programming in C++ to solve basic engineering problems. |
| CC-2 | Computer System Architecture | A student should be able to: <ul style="list-style-type: none"> CO1. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os. |

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| | | <p>CO2. Analyze the performance of commercially available computers.</p> <p>CO3. To develop logic for assembly language programming</p> |
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Semester-II

| Course code | Course Title | Course Outcomes |
|-------------|---------------------|---|
| CC-3 | Programming in Java | <p>A student should be able to:</p> <p>CO1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.</p> <p>CO2. Write Java application programs using OOP principles and proper program structuring.</p> <p>CO3. Demonstrate the concepts of polymorphism and inheritance.</p> <p>CO4. Write Java programs to implement error handling techniques using exception handling.</p> |
| CC-4 | Discrete Structure | <p>A student should be able to:</p> <p>CO1. Write an argument using logical notation and determine if the argument is or is not valid.</p> <p>CO2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.</p> <p>CO3. Understand the basic principles of sets and operations in sets.</p> <p>CO4. Apply counting principles to determine probabilities.</p> <p>CO5. Model problems in Computer Science using graphs and trees.</p> |

Semester-III

| Course code | Course Title | Course Outcomes |
|-------------|----------------|---|
| CC-5 | Data Structure | <p>A student should be able to:</p> <p>CO1. Impart the basic concepts of data structures and algorithms</p> <p>CO2. Understand basic concepts about stacks, queues, lists, trees and graphs</p> |

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| | | <p>CO3. Understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures</p> <p>CO4. Compare alternative implementations of data structures with respect to performance.</p> <p>CO5. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.</p> |
| CC-6 | Operating Systems | <p>A student should be able to:</p> <p>CO1. Describe and explain the fundamental components of a computer operating system.</p> <p>CO2. Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.</p> <p>CO3. Describe and extrapolate the interactions among the various components of computing systems.</p> <p>CO4. Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.</p> |
| CC-7 | Computer Networks | <p>A student should be able to:</p> <p>CO1. Explain the local, metropolitan and wide area networks using the Standard OSI reference model.</p> <p>CO2. Discussion of various networking technologies.</p> <p>CO3. Evaluate the challenges in building networks and solutions to those.</p> <p>CO4. Explain the analysis of different types of protocol and the comparison of number of data link, network and transport layer protocols.</p> |
| SEC-1 | Programming in Python | <p>A student should be able to:</p> <p>CO1. Explain basic principles of Python programming language.</p> <p>CO2. Implement object oriented concepts.</p> <p>CO3. Implement database and GUI applications.</p> |

Semester-IV

| Course code | Course Title | Course Outcomes |
|-------------|-----------------------------------|--|
| CC-8 | Design and Analysis of Algorithms | <p>A student should be able to :</p> <p>CO1. Analyze the running time and space complexity of algorithms.</p> |

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| | | <p>CO2. Describe, apply and analyze the complexity of divide and conquer , greedy, dynamic programming strategy.</p> <p>CO3. Able to Describe the classes P, NP, and NPComplete and be able to prove that a certain problem is NP-Complete.</p> <p>CO4. Able to analyze String matching algorithms.</p> |
| CC-9 | Software Engineering | <p>A student should be able to:</p> <p>CO1. Understand basic SW engineering methods and practices, and their appropriate application.</p> <p>CO2. Role of project management including planning, scheduling and, risk management.</p> <p>CO3. Discuss data models, object models, context models and behavioural models.</p> <p>CO4. Understand of implementation issues such as modularity and coding standards.</p> <p>CO5. Understand to verification and validation including static analysis, and reviews.</p> <p>CO6. Describe software measurement and software risks.</p> |
| CC-10 | Database Management System | <p>A student should be able to:</p> <p>CO1. Describe the fundamental elements of relational database management systems.</p> <p>CO2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.</p> <p>CO3. Design ER-models to represent simple database application scenarios.</p> <p>CO4. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.</p> <p>CO5. Improve the database design by normalization.</p> <p>CO6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.</p> |
| SEC-2 | UNIX / Linux Programming | <p>A student should be able to:</p> <p>CO1. Understanding the basic set of commands and utilities in Linux/UNIX systems.</p> <p>CO2. To learn to develop software for Linux/UNIX systems.</p> <p>CO3. To learn the important Linux/UNIX library functions and system calls.</p> <p>CO4. To understand the inner workings of UNIX-like operating systems.</p> |

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| | | CO5. To obtain a foundation for an advanced course in operating systems. |
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Semester-V

| Course code | Course Title | Course Outcomes |
|-------------|-----------------------|---|
| CC-11 | Internet Technologies | A student should be able to: CO1. Analyze a web page and identify its elements and attributes. CO2. Create web pages using XHTML and Cascading Style Sheets. CO3. Build dynamic web pages using JavaScript (Client side programming). CO4. Create XML documents and Schemas. |
| CC-12 | Theory of Computation | A student should be able to: CO1. Explain the basic concepts of finite automata and regular expressions. CO2. Describe the types of grammar and derivation tree. CO3. Test the equivalence of pushdown automata and CFL. CO4. Develop a computational model using Turing machine for the given problem. CO5. Examine the complexity for P and NP completeness for the given problem. |
| DSE-1 | Microprocessors | Students are able to: CO1. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system. CO2. Identify a detailed s/w & h/w structure of the Microprocessor. CO3. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor. CO4. Distinguish and analyze the properties of Microprocessors & Microcontrollers. CO5. Analyze the data transfer information through serial & parallel ports. CO6. Train their practical knowledge through laboratory experiments. |
| DSE-2 | System Programming | Upon completion of this course, students are be able to: |

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| | | <p>CO1. To cover the major topics in compiler design with emphasis on solving the problems encountered in designing a compiler regardless of the source language or the target machine</p> <p>CO2. Explore the use of compiler with its phases.</p> <p>CO3. Use of Syntax directed scheme for intermediate code generation.</p> <p>CO4. Construct & use of different compiler tools as LeX, Yacc for code generation & optimization.</p> |
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Semester-VI

| Course code | Course Title | Course Outcomes |
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| CC-13 | Artificial Intelligence | <p>On completion of the course students will be able to:</p> <p>CO1. Understand concept of knowledge representation and predicate logic and transform the real life information in different representation</p> <p>CO2. Understand state space and its searching strategies.</p> <p>CO3. Understand machine learning concepts and range of problems that can be handled by machine learning.</p> <p>CO4. Understand the numerous applications and huge possibilities in the field of AI</p> <p>CO5. To analyze and formalize the problem as a state space, graph, design heuristics</p> <p>CO6. Ability to represent solutions for various real-life problem domains using logic based techniques</p> |
| CC-14 | Computer Graphics | <p>After learning the course the students should be able to:</p> <p>CO1. Explain fundamental concepts within computer graphics such as geometrical transformations, illumination models, removal of hidden surfaces and rendering</p> <p>CO2. Explain the ideas in some fundamental algorithms for computer graphics and to some extent be able to compare and evaluate them</p> <p>CO3. Explain and apply fundamental principles within interaction programming</p> <p>CO4. Explain and understand fundamental concepts within information visualization and scientific visualization.</p> |
| DSE-3 | Soft Computing | <p>Upon completion of the course, the student are expected to :</p> |

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| | | <p>CO1. Analyze and integrate various soft computing techniques in order to solve problems effectively and efficiently</p> <p>CO2. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.</p> <p>CO3. Apply neural networks to pattern classification and regression problems.</p> <p>CO4. Apply genetic algorithms to combinatorial optimization problems.</p> <p>CO5. Apply these techniques in applications which involve perception, reasoning and learning.</p> |
| DSE-4 | Project Work / Dissertation | <p>A student should be able to:</p> <p>CO1. Understand programming language concepts, particularly Java and object-oriented concepts or go through research activities.</p> <p>CO2. Plan, analyze, design and implement a software project or gather knowledge over the field of research and design or plan about the proposed work.</p> <p>CO3. Demonstrate the ability to locate and use technical information from multiple sources.</p> <p>CO4. Demonstrate the ability to communicate effectively in speech and writing.</p> <p>CO5. Learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.</p> <p>CO6. Learn about and go through the software development cycle with emphasis on different processes - requirements, design, and implementation phases.</p> |

Course Outcomes of UG General Courses

Semester-I

| Course code | Course Title | Course Outcomes |
|-------------|--------------------------------|---|
| CC-1A | Problem solving Using Computer | Upon completion of the course, the students will be able to: CO1. Bridge the fundamental concepts of computers with the present level of knowledge of the students. CO2. Explain basic principles of Python programming language. CO3. Implement object oriented concepts. CO4. Implement GUI applications. |

Semester-II

| Course code | Course Title | Course Outcomes |
|-------------|-----------------------------|---|
| CC-1B | Database Management Systems | On successful completion of the course the students will be able to: CO1. Understand database concepts and structures and query language. CO2. Understand the E R model and relational model. CO3. To design and build a simple database system and demonstrate its competence CO4. Fundamental tasks involved with modeling, designing, and implementing a DBMS. |

Semester-III

| Course code | Course Title | Course Outcomes |
|-------------|-------------------|---|
| CC-1C | Operating Systems | A student should be able to: CO1. Understands the different services provided by Operating System at different level. CO2. They learn real life applications of Operating System in every field. CO3. Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock. |

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| | | <p>CO4. They will learn different memory management techniques like paging, segmentation and demand paging etc.</p> <p>CO5. Demonstrate UNIX commands for file handling and process control..</p> |
| SEC-1 | Office Automation Tools | <p>By learning the course, the students will be able:</p> <p>CO1. To perform documentation.</p> <p>CO2. To perform accounting operations.</p> <p>CO3. To perform presentation skills.</p> |

Semester-IV

| Course code | Course Title | Course Outcomes |
|--------------------|-------------------------------------|---|
| CC-1D | Computer System Architecture | <p>Upon completion of this course, the students will be able to:</p> <p>CO1. Describe the fundamental organisation of a computer system.</p> <p>CO2. Explain the functional units of a processor.</p> <p>CO3. Explain addressing modes, instruction formats and program control statements.</p> <p>CO4. Distinguish the organization of various parts of a system memory hierarchy.</p> <p>CO5. Exemplify in a better way the I/O and memory organization.</p> |
| SEC-2 | HTML Programming | <p>Upon completion of the course students will be able to:</p> <p>CO1. Use knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites following current professional and/or industry standards.</p> <p>CO2. Use critical thinking skills to design and create websites.</p> |

Semester-V

| Course code | Course Title | Course Outcomes |
|--------------------|-----------------------------|---|
| DSE-1A | Software Engineering | <p>A student should be able to:</p> <p>CO1. Students will be able to decompose the given project in various phases of a lifecycle.</p> <p>CO2. Students will be able to choose appropriate process model depending on the user requirements.</p> <p>CO3. Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.</p> |

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| | | <p>CO4. Students will be able to know various processes used in all the phases of the product.</p> <p>CO5. Students can apply the knowledge, techniques, and skills in the development of a software product.</p> |
| SEC-3 | MySQL/PL-SQL | <p>At the end of the course the students are able to:</p> <p>CO1. Apply the basic concepts of Database Systems and Applications.</p> <p>CO2. Use the basics of SQL and construct queries using MySQL in database creation and interaction.</p> <p>CO3. Design a commercial relational database system (MySQL) by writing SQL using the system.</p> <p>CO4. Analyze and Select storage and recovery techniques of database system.</p> |

Semester-VI

| Course code | Course Title | Course Outcomes |
|--------------------|------------------------------------|---|
| DSE-1B | Computer Networks | <p>A student should be able to:</p> <p>CO1. Recognize the technological trends of Computer Networking.</p> <p>CO2. Discuss the key technological components of the Network.</p> <p>CO3. Evaluate the challenges in building networks and solutions to those.</p> |
| SEC-4 | Programming in Visual Basic | <p>A student should be able to:</p> <p>CO1. Demonstrate fundamental skills in utilizing the tools of a visual environment such as command, menus and toolbars.</p> <p>CO2. Implement SDI and MDI applications using forms, dialogs, and other types of GUI components.</p> <p>CO3. Implement the methods and techniques to develop projects.</p> <p>CO4. Learn the advantages of Controls in VB.</p> <p>CO5. Design and develop the event- driven applications using Visual Basic framework.</p> |