THE BHAWANIPUR EDUCATION SOCIETY COLLEGE

A MINORITY RUN COLLEGE. AFFILIATED TO UNIVERSITY OF CALCUTTA
RECOGNISED UNDER SECTION 2(F) & 12 (B) OF THE UGC ACT, 1956

Program Specific Outcome

B.Sc. (Honours) Computer Science 2020-2021

The **Program Specific Outcome** for B. Sc. in Computer Science is as follows:

PSO1: Students can apply mathematical and scientific reasoning to a variety of computational problems.

PSO2: Students can formulate, analyse and compare alternative solutions to computing problems.

PSO3: Students learn how to deal with criticism of their ideas in a professional manner, and also use it to improve their designs.

PSO4: Students can design and implement software systems that meet specified design and performance requirements.

PSO5: Students can acquire inquisitive attitude and skill to enable creating an original discovery or design related to computing.

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Program Outcome

B.Sc. (Honours) Computer Science 2020-2021

	Program Outcome	Description
PO1	**Subject Knowledge**	This course prepares students with the basic understandings in the theoretical and practical aspects of computer science discipline necessary for further study.
	Method of Measurement:	**Assessment (Internal & Final)**
PO2	**Problem Analysis**	Students are able to apply fundamental principles and methods of Computer Science to a wide range of applications. They can design and implement software systems that meet specified design and performance requirements.
	Method of Measurement:	**Continuous Practical Assignment**
PO3	**Critical Thinking**	Students can apply mathematical and scientific reasoning to a variety of computational problems. They can also formulate, analyze and compare alternative solutions to computing problems. They can acquire inquisitive attitude and skill to enable creating an original discovery or design related to computing.
	Method of Measurement:	**Assessment (Internal & Final)**
PO4	**Effective Communication**	Students are able to present their ideas flawlessly, not only in English, but also in Mathematical/Algorithmic Terms.
	Method of Measurement:	**Algorithm Writing and Explanation in Assignments and on Boards.**
PO5	**Social Interaction**	Students learn how to deal with criticism of their ideas in a professional manner, and also use it to improve their designs.
	Method of Measurement:	**Regular Presentation Seminars**

PO6	**Ethics**	Students can learn the ethical and social responsibilities required for a professional in this field.
	Method of Measurement:	**Regular Assignment Analysis by the Teachers**
PO7	**Self-Directed and life-long learning:**	Students can acquire a life-long interest in the field of Computer Science, which will motivate them to continue the process of learning even after the completion of this course.
	Method of Measurement:	**Student-Teacher Interaction on Research Topics**

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Course Outcome

B.Sc. (Honours) Computer Science 2020-2021

Subject: Computer Science (Honours) 2020-2021	
Paper	**Course Outcome**
Semester 1	
CMS-A-CC-1-1	
Theory: Digital Logic	**COCC1.1:** Develop an understanding about the various Number Systems used in Computer Science.
	COCC1.2: Learn about the building blocks of digital circuits, and use them to create bigger combinational and sequential circuits.
Practical: Digital Circuits	**COCC1.3:** Learn how to make basic digital circuits by hand.
CMS-A-CC-1-2	
Theory: Programming Fundamentals using C	**COCC2.1:** Learn the theoretical background of the C programming language.
Practical: Programming Fundamentals using C	**COCC2.2:** Develop the ability to write programs in C language.
Semester 2	
CMS-A-CC-2-3	
Theory: Data Structures	**COCC3.1:** Develop an understanding about the various data structures and its applications.
	COCC3.2: Learn about the various algorithm writing techniques and use them to express the ideas behind the programs.
Practical: Data Structures using C	**COCC3.3:** Learn how to implement the various Data Structures in C.
CMS-A-CC-2-4	
Theory: Basic Electronic Devices and Circuits	**COCC4.1:** Learn the theoretical background that enables the proper functioning of basic electronic devices
	COCC4.2: Develop an understanding about the various electronic technologies available that are integral to the design of computer circuits.
Practical: Basic Electronic Devices and Circuits	**COCC4.3:** Develop the ability to design electronic circuits by hand.

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Semester 3	
CMS-A-CC-3-5	
Theory: Computer Organization and Architecture	**COCC5.1:** Learn about the various components of a digital computer, and understand how they are integrated to create a Computer System
Practical: Computer Organization and Architecture	**COCC5.2:** Learn how to make advanced digital circuits by hand
CMS-A-CC-3-6	
Theory: Computational Mathematics	**COCC6.1:** Develop an ability to solve computational problems using the fundamental laws of Discrete Mathematics
	COCC6.2: Learn how to model real life problems by studying the structural properties of a Graph
	COCC6.3: Apply the knowledge of Numerical Methods to solve real life numerical problems;
Practical: Numerical Methods Lab	**COCC6.4:** Learn how to implement Numerical Algorithms in C Programming.
CMS-A-CC-3-7	
Theory: Operating Systems	**COCC7.1:** Develop a deep understanding of the design issues and working of an Operating System.
Practical: Shell Scripting	**COCC7.2:** Learn how to write programs using shell scripting.
CMS-A- SEC-A-3-1-TH	
Theory: Computer Graphics	**COSECA1.1:** Learn about the various display devices and the mathematical algorithms used to create Graphics based applications.
CMS-A- SEC-A-3-2-TH	
Theory: IOT	**COSECA2.1:** Study about the basic building blocks of IOT devices and see how they're interconnected to create real life systems.

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Semester 4	
CMS-A-CC-4-8	
Theory: Data Communication, Networking and Internet Technology	**COCC8.1:** Develop a deep understanding of Computer Networks, the various protocols in use today and the existing architectures used to create a network.
	COCC8.2: Understand the fundamentals of data communication.
Practical: Computer Networking and Web-Design Lab	**COCC8.3:** Learn how to design web-pages using HTML and CSS.
	COCC8.4: Learn how to make your web-pages more dynamic using JavaScript.
	COCC8.5: Learn about the fundamentals of working with networking cables and other networking hardware devices.
CMS-A-CC-4-9	
Theory: Introduction to Algorithms and its applications	**COCC9.1:** Develop an ability to write efficient algorithms.
	COCC9.2: Learn how to compare two or more algorithms by looking at their running time complexity and space requirements.
	COCC9.3: Understand the working of different graph algorithms.
Practical: Algorithm Labs	**COCC9.4:** Learn how to implement Graph Algorithms in C Programming.
CMS-A-CC-4-10	
Theory: Microprocessor & its Applications	**COCC10.1:** Learn about the architecture of the 8085 microprocessor, acquire the ability to interface it with various IO devices and develop problem solving skills related to 8085 microprocessors.
	COCC10.2: Learn about the architecture of the 8086 Microprocessor.
Practical: Programming with Microprocessor - 8085	**COCC10.3:** Learn how to program in 8085 microprocessors.
CMS-A- SEC-B-4-1-TH	
Theory: Information Security	**COSECB1.1:** Learn the mathematical foundation of cryptography.
	COSECB1.2: Learn about the different cryptography ciphers and algorithms.
	COSECB1.3: Develop a deep understanding of the principles of network security.
	COSECB1.4: Learn about the different Cyber Laws in India.
CMS-A- SEC-B-4-2-TH	
Theory: E-Commerce	**COSECB2.1:** Study about the basic building blocks of E-Commerce Systems
	COSECB2.2: Learn about the different cryptography ciphers and algorithms.

Semester 5	
CMS-A-CC-5-11	
Theory: Database Management System	**COCC11.1:** Students will get to learn how to design a good database for any automated system.
	COCC11.2: Students will learn structured organization and access mechanisms of stored data.
	COCC11.3: Students will learn usage of standard database packages and development of online systems.
Practical: RDBMS Lab using MySQL and PHP	**COCC11.4:** The students will be able to know how the database works and how to perform any kind of database-related application. The use of MySQL is highly emphasized in this course.
	COCC11.5: By means of PHP scripting language dynamic and interactive webpage design and connection with the database is encouraged in this course.
	COCC11.6: At the end of this course, the students will be able to make a full-fledged website by using PHP, MySQL and other web-based scripting language which are already taught in the CC8 course.
CMS-A-CC-5-12	
Theory: Object Oriented Programming	**COCC12.1:** Students will learn the Fundamentals of Object Oriented Programming wit Java.
	COCC12.2: Students will learn how to compare Object Oriented Programming Paradigm with its predecessor – Procedural Oriented Programming
	COCC12.3: Students will learn the advanced concepts of Java Programming – Multithreading, Swing, AWT, and JDBC.
Practical: OOPs Lab using Java	**COCC12.4:** Students will learn how to code using JAVA.
	COCC12.5: Students will learn how to design GUIs using Swing and AWT.
	COCC12.6: Students will learn hot to make Desktop Apps by connecting GUIs made with AWT/Swing and Databases using JDBC.
CMS-A-DSE-A-2	
Theory: Data Mining & its Applications	**CODSEA2.1:** The students will acquire a comprehensive knowledge regarding the trending data science related concepts.
	CODSEA2.2: The understanding of data-mining problems would not only enrich them in their academics, but also it will help them in the industry.
	CODSEA2.3: An understanding of data warehousing is also provided in this course.
Practical: Data Mining Lab	**CODSEA2.4:** Preparation of processed data from raw information repositories is encouraged as a primary objective of this course.
	CODSEA2.5: The real-life implementation of the Machine-Learning based problems is approached in this course.

	CODSEA2.6: All these implementations in this course are carried out using the Python programming language. Some necessary packages such as Pandas, numpy, scikit-learn and other recent packages are also explained in this course.
	CODSEA2.7: As a result, the students will get an opportunity to excel in Artificial Intelligence and Machine Learning based industries in their career.
CMS-A- DSE-B-2	
Theory: Programming using Python	**CODSEB2.1:** Learn the basic syntax of the Python Programming Language.
	CODSEB2.2: Learn about the inbuilt data structures present in python – lists, strings, tuples, dictionaries and sets.
	CODSEB2.3: Understand the differences between Python and the other OOP languages.
	CODSEB2.4: Develop a deep understanding of the principles of OOP in Python and
Practical: Programming in Python Lab	**CODSEB2.5:** Learn how to write code in Python, using the "Pythonic" style of coding
	CODSEB2.6: Learn to implement Graph algorithms in Python.

Semester 6	
CMS-A-CC-6-13	
Theory: Software Engineering	**COCC13.1:** Students get to understand and learn the build process of software development.
	COCC13.2: Students gain knowledge on analyzing any existing system for automation.
	COCC13.3: Students get to learn maintenance requirements of any active software system.
CMS-A-CC-6-14	
Theory: Theory of Computation	**COCC14.1:** Students will not only learn about the building blocks of different types of Automata, but also of the role it plays in modern computers.
	COCC14.2: Students will learn about the different types of Formal Languages and how to represent them using Grammars, Regular Expressions and Automata.
	COCC14.3: Students will learn about the working principle of a Turing Machine and the different types of problems that exist in the fields of Computer Science.
Practical: Project	**COCC14.4:** Students will learn how to make use of the experiences accumulated during the entire course and implement a real-life project.
CMS-A-DSE-A-4	
Theory: Multimedia and its Applications	**CODSEA4.1:** The students will acquire sound knowledge in various areas like audio-video editing, graphic designing, web designing, VFX, creating 2-D and 3-D animation and multimedia programming.
	CODSEA4.2: Being able to create different forms of engaging and creative content across platforms makes the students an asset to a company in future.
Practical: Multimedia and its Applications Lab	**CODSEA4.3:** The use of different forms of multimedia is taught in multimedia software.
	CODSEA4.4: The real-life implementations of the multimedia based problems are approached in this course.
CMS-A- DSE-B-3	
Theory: Introduction to Computational Intelligence	**CODSEB3.1:** Students are taught the traditional Artificial Intelligence concepts.
	CODSEB3.2: The concepts of Neural Networks along with mathematical backgrounds are provided in this course.
	CODSEB3.3: A subset of AI, i.e Fuzzy logic is also introduced and the related concepts are also explained in this course.
Practical: Computational Intelligence Lab	**CODSEB3.4:** The use of declarative programming languages such as Prolog is taught.
	CODSEB3.5: The concepts of recursive programming are highly emphasized in this course.

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MAPPING OF PO AND CO							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
COCC1.1	✓	✓					
COCC1.2	✓	✓	✓				✓
COCC1.3		✓	✓	✓			✓
COCC2.1	✓						✓
COCC2.2		✓	✓	✓	✓	✓	
COCC3.1	✓	✓					
COCC3.2	✓	✓	✓				✓
COCC3.3		✓	✓	✓		✓	✓
COCC4.1	✓	✓					
COCC4.2	✓	✓	✓				✓
COCC4.3		✓	✓	✓		✓	✓
COCC5.1	✓	✓					
COCC5.2	✓	✓	✓	✓	✓	✓	✓
COCC6.1	✓	✓					✓
COCC6.2	✓	✓					✓
COCC6.3	✓	✓					✓
COCC6.4		✓	✓	✓	✓	✓	✓
COCC7.1	✓	✓					✓
COCC7.2	✓	✓	✓	✓	✓	✓	✓
COSECA1.1	✓	✓					✓
COSECA2.1	✓	✓					✓
COCC8.1	✓						
COCC8.2	✓						
COCC8.3	✓	✓	✓	✓	✓	✓	✓
COCC8.4	✓	✓	✓	✓	✓	✓	✓
COCC8.5	✓	✓	✓	✓	✓	✓	✓
COCC9.1	✓		✓				✓
COCC9.2	✓	✓	✓				✓
COCC9.3	✓	✓	✓				✓
COCC9.4		✓	✓	✓	✓	✓	✓
COCC10.1	✓	✓	✓				✓
COCC10.2	✓	✓	✓				✓
COCC10.3		✓	✓	✓	✓	✓	✓

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COSECB1.1	✓	✓					✓
COSECB1.2	✓	✓					✓
COSECB1.3	✓	✓					✓
COSECB1.4	✓	✓					✓
COSECB2.1	✓	✓					✓
COSECB2.2	✓	✓					✓
COCC11.1	✓	✓				✓	✓
COCC11.2	✓					✓	✓
COCC11.3	✓					✓	✓
COCC11.4	✓	✓	✓	✓	✓	✓	✓
COCC11.5	✓	✓	✓	✓	✓	✓	✓
COCC11.6	✓	✓	✓	✓	✓	✓	✓
COCC12.1	✓	✓	✓			✓	✓
COCC12.2	✓	✓	✓			✓	✓
COCC12.3	✓	✓	✓			✓	✓
COCC12.4		✓	✓	✓	✓	✓	✓
COCC12.5		✓	✓	✓	✓	✓	✓
COCC12.6		✓	✓	✓	✓	✓	✓
CODSEA2.1	✓	✓				✓	✓
CODSEA2.2	✓	✓				✓	✓
CODSEA2.3	✓	✓				✓	✓
CODSEA2.4		✓	✓	✓	✓	✓	✓
CODSEA2.5		✓	✓	✓	✓	✓	✓
CODSEA2.6		✓	✓	✓	✓	✓	✓
CODSEA2.7		✓	✓	✓	✓	✓	✓
CODSEB2.1	✓	✓	✓	✓		✓	✓
CODSEB2.2	✓	✓	✓	✓		✓	✓
CODSEB2.3	✓	✓	✓	✓		✓	✓
CODSEB2.4	✓	✓	✓	✓		✓	✓
CODSEB2.5		✓	✓	✓	✓	✓	✓
CODSEB2.6		✓	✓	✓	✓	✓	✓
COCC13.1	✓	✓				✓	✓
COCC13.2	✓	✓				✓	✓
COCC13.3	✓	✓				✓	✓
COCC14.1	✓					✓	✓
COCC14.2	✓					✓	✓
COCC14.3	✓					✓	✓
COCC14.4		✓	✓	✓	✓	✓	✓
CODSEA4.1	✓					✓	✓

CODSEA4.2	✓					✓	✓
CODSEA4.3	✓	✓	✓	✓	✓	✓	✓
CODSEA4.4	✓	✓	✓	✓	✓	✓	✓
CODSEB3.1	✓					✓	✓
CODSEB3.2	✓					✓	✓
CODSEB3.3	✓					✓	✓
CODSEB3.4		✓	✓	✓	✓	✓	✓
CODSEB4.5		✓	✓	✓	✓	✓	✓