

## Learning outcomes of CBCS Syllabus for UG in Computer Science (Hons.)

Today, the world is shrinking as it is becoming more and more digital, the scope of computer science is rising. Students want to learn computer science need to learn design, implementation and management of both software and hardware processes. The new CBCS syllabus of Computer Science of University of Calcutta is very rich that emphasis on the basic key elements of computer programming using C, Java, as well as networking, multimedia and also hardware part – electronics, architecture, microprocessor, digital circuits.

### Semester – I

	Topic	Learning Outcome
CC – 1 Theory	Digital Logic	Gives the basic concepts on Computer fundamentals, number systems, Boolean algebra. The learners are also familiar with combinational and sequential circuits which are the building blocks of digital system.
CC – 1 Practical	Digital Circuits	
CC – 2 Theory	Programming Fundamentals using C	C is one of the basic programming language used in computer science. This section gives a basic and clear idea on C language.
CC – 2 Practical	Programming with C	Learners can achieve problem solving capability using C Language.

### Semester – II

	Topic	Learning Outcome
CC – 3 Theory	Data Structure	Concepts will grow on data types, array, pointers, linked lists, sorting and searching techniques, tree etc. Learners will solve problems using C Language, which will enrich their knowledge on programming.
CC – 3 Practical	Data Structure using C	
CC – 4 Theory	Basic Electronic Devices and Circuits	Learners will achieve basic concepts on electronic devices, such as semiconductor devices, diode, triode, transistors, SCR, DIAC, TRIAC, FET, JFET, MOSFET, OP-AMP, Timer etc.
CC – 4 Practical	Basic Electronics Devices and Circuits Lab.	

### Semester – III

	Topic	Learning Outcome
CC – 5 Theory	Computer Organization & Architecture	Overall idea on internal structure of Computer System. Sound knowledge on Micro-operation, CPU organization, Control Unit, CPU Registers, CISC & RISC Processors, Memory, Peripherals.
CC – 5 Practical	Computer Organization Lab.	
CC – 6 Theory	Computational Mathematics	Computational Mathematics play important role in Computer Science. This section gives knowledge on Set, Functions, Probability, Recurrences, Numerical methods, Graph Theory. Lab work to be done using C language.
CC – 6 Practical	Computational Mathematics Lab	
CC – 7 Theory	Operating Systems	Learners will achieve knowledge on basic operating system functions, types of operating systems, how jobs are processed, deadlock managed, memory, file are managed, security is maintained etc.
CC – 7 Practical	Operating Systems Lab	
<b>Skill Enhancement Course (SEC – A)</b>		
<b>Candidate has to opt any one from the under mentioned courses</b>		
SEC-A-1 Theory	Computer Graphics	Theoretical concepts on Graphics Devices, Geometrical shapes formation algorithms, Transformations, Clipping, Projection, Animations.
SEC-A-2 Theory	IoT (Internet of Things)	Knowledge on basic design, Characteristics, Models, Design, Functional Blocks, IoT network, IoT physical Server, IoT Analytics, Applications, Development.

## Semester – IV

	Topic	Learning Outcome
CC – 8 Theory	Data Communication, Networking and Internet Technology.	Concept will grow on networking model, structure, hardware, layers, transmission, bandwidth, switching and other networking devices. Learn to handle networking cables, connectors, hubs, switches; LAN installation & configuration; Web page designing by HTML.
CC – 8 Practical	Computer Networking and Web Design Lab.	
CC – 9 Theory	Introduction to Algorithm & its Application.	Concepts on Algorithm, analysis, design, representation, classification of problems.
CC – 9 Practical	Algorithms Lab.	In lab, learners will solve different algorithms using C.
CC – 10 Theory	Microprocessor and its Applications.	Basic concepts on 8085, 8086 microprocessor architecture, interfacing memory and peripheral devices, delays, different applications, analog to digital conversions.
CC – 10 Practical	Programming with microprocessor 8085.	In lab, assembly language programs are solved using 8085 microprocessor kit.
<b>Skill Enhancement Course (SEC-B)</b> Candidate has to opt any one from the under mentioned courses		
SEC–B–1 Theory	Information Security.	Basic concepts, security architecture, cryptography, finite field and number theory, Hash functions and digital signatures, Firewalls.
SEC–B–2 Theory	E-Commerce.	Technical components, functions, scope, applications, internet security, internet marketing, data exchange.

## Semester – V

	Topic	Learning Outcome
CC – 11 Theory	Database Management System (DBMS).	Knowledge on ER model, relational model, constraints, database design, record storage, file organization.
CC – 11 Practical	RDBMS lab using My SQL & PHP.	Practical knowledge of database handling using My SQL & PHP.
CC – 12 Theory	Object Oriented Programming (OOPs).	Concepts, overview, principles, inheritance, interfaces, packages, enumerations, metadata, exception handling, threading, networking and database connectivity.
CC – 12 Practical	OOPs lab using JAVA.	Hands on working with JAVA applets in Lab.
<b>Discipline Specific Elective Course – DSE-A (1&amp;2) and DSE-B (1&amp;2),</b> Candidate has to opt one course from DSE-A and one course from DSE-B		
DSE-A-1 Theory	Digital Image Processing.	Introduction, Spatial Domain, Thresholding, Image Segmentation,
DSE-A-1 Practical	Image Processing Lab.	Assignments on Different Image Processing Functions based on Open CV & Python/Scilab.
DSE-A-2 Theory	Data Mining & its Application.	Introduction, classification & prediction, Data Warehousing.
DSE-A-2 Practical	Data Mining Lab.	Data mining using PYTHON/C.
DSE-B-1 Theory	Operation Research (O.R.)	Introduction, LPP, Simplex, Duality, Transportation, Assignment, Game theory, network scheduling.
DSE-B-1 Practical	Operation Research Lab.	Lab sessions related to Simplex Method, Transportation and assignment problem using C.
DSE-B-2 Theory	Programming using Python.	Intro, strings, lists, tuples, conditionals, iterators & generators, functions, file handling, exception handling, unordered data types.
DSE-B-2 Practical	Programming in Python Lab.	

## Semester – VI

	Topic	Learning Outcome
CC – 13 Theory	Software Engineering.	Introduction, software life cycle, requirement, analysis, testing, quality assurances.
CC – 14 Theory	Theory of Computation.	Finite Automata, Formal Languages & Grammar, Regular expression, Turing machine.
CC – 14 Practical	Project Work.	Project done on any relevant topic, so that, learners can gather knowledge on how live projects are done.
<b>Discipline Specific Elective Course – DSE-A (3&amp;4) and DSE-B (3&amp;4)</b> Candidate has to opt one course from DSE-A & one course from DSE-B		
DSE-A-3 Theory	Embedded Systems.	Introduction to 8051, assembly language programming, embedded system programming, programmable logic devices, hardware description language.
DSE-A-3 Practical	Embedded Systems Lab.	
DSE-A-4 Theory	Multimedia and its Application.	Introduction, uses, making, images, sound, video, animations, multi-modal communications.
DSE-A-4 Practical	Multimedia and its Application Lab.	Simple practical problems.
DSE-B-3 Theory	Introduction to Computational Intelligence.	Introduction, neural network, rough sets, fuzzy logic and applications.
DSE-B-3 Practical	Computational Intelligence Lab.	Lab using Prolog/LISP.
DSE-B-4 Theory	Advance Java.	Servlet, session management, JSP, design pattern, Javascript, JQuery.
DSE-B-4 Practical	Advance Java Lab.	Writing programs in Java using Servlets, programs with session tracking, creating dynamic web pages, programs using JDBC, writing Web Service.

### Career opportunities of a Computer Science student ....

**Academic / Research.**  
**Programmer / Software Developers.**  
**Web Developers.**  
**Database developers.**  
**Mobile Application Developers.**  
**Database Manager.**  
**Database Analysts.**  
**System Analysts.**  
**Security Analysts.**  
**Quality Analysts.**  
**Information Technology Auditor.**  
**Multimedia designer.**  
**Hardware Specialists.**  
**Robotics.**  
**IoT.**

And many new paths are opening .....