

Choice Based Credit System (CBCS)

UNIVERSITY OF DELHI

DEPARTMENT OF COMPUTER SCIENCE

**UNDERGRADUATE PROGRAMME
(Courses effective from Academic Year 2015-16)**



**SYLLABUS OF COURSES TO BE OFFERED
(General Elective for students other than B.Sc. (Hons.)/Computer Science)**

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Undergraduate Programme Secretariat

Preamble

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

The UGC has formulated various regulations and guidelines from time to time to improve the higher education system and maintain minimum standards and quality across the Higher Educational Institutions (HEIs) in India. The academic reforms recommended by the UGC in the recent past have led to overall improvement in the higher education system. However, due to lot of diversity in the system of higher education, there are multiple approaches followed by universities towards examination, evaluation and grading system. While the HEIs must have the flexibility and freedom in designing the examination and evaluation methods that best fits the curriculum, syllabi and teaching-learning methods, there is a need to devise a sensible system for awarding the grades based on the performance of students. Presently the performance of the students is reported using the conventional system of marks secured in the examinations or grades or both. The conversion from marks to letter grades and the letter grades used vary widely across the HEIs in the country. This creates difficulty for the academia and the employers to understand and infer the performance of the students graduating from different universities and colleges based on grades.

The grading system is considered to be better than the conventional marks system and hence it has been followed in the top institutions in India and abroad. So it is desirable to introduce uniform grading system. This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students. To bring in the desired uniformity, in grading system and method for computing the cumulative grade point average (CGPA) based on the performance of students in the examinations, the UGC has formulated these guidelines.

CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

Outline of Choice Based Credit System:

- 1. Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
- 2. Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.
 - 2.1 Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
 - 2.2 Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.
 - 2.3 Generic Elective (GE) Course:** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.

P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.
- 3. Ability Enhancement Courses (AEC)/Competency Improvement Courses/Skill Development Courses/Foundation Course:** The Ability Enhancement (AE) Courses may be of two kinds: AE Compulsory Course (AECC) and AE Elective Course (AEEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement. They ((i) Environmental Science, (ii) English/MIL Communication) are mandatory for all disciplines. AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.
 - 3.1 AE Compulsory Course (AECC):** Environmental Science, English Communication/MIL Communication.
 - 3.2 AE Elective Course (AEEC):** These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

Details of courses under B.A (Honors), B.Com (Honors) & B.Sc. (Honors)

Course	*Credits	
	Theory+ Practical	Theory + Tutorial
<u>I. Core Course</u>		
(14 Papers)	14X4= 56	14X5=70
Core Course Practical / Tutorial*		
(14 Papers)	14X2=28	14X1=14
<u>II. Elective Course</u>		
(8 Papers)		
A.1. Discipline Specific Elective	4X4=16	4X5=20
(4 Papers)		
A.2. Discipline Specific Elective		
Practical/ Tutorial*	4 X 2=8	4X1=4
(4 Papers)		
B.1. Generic Elective/		
Interdisciplinary	4X4=16	4X5=20
(4 Papers)		
B.2. Generic Elective		
Practical/ Tutorial*	4 X 2=8	4X1=4
(4 Papers)		
<ul style="list-style-type: none"> • Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester 		
<u>III. Ability Enhancement Courses</u>		
1. Ability Enhancement Compulsory		
(2 Papers of 2 credit each)	2 X 2=4	2 X 2=4
Environmental Science		
English/MIL Communication		
2. Ability Enhancement Elective (Skill Based)		
(Minimum 2)	2 X 2=4	2 X 2=4
(2 Papers of 2 credit each)		
Total credit	140	140
Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.		
* wherever there is a practical there will be no tutorial and vice-versa		

General Elective Papers (GE) (Minor – Computer Science) for other Departments/Disciplines: (Credit: 06 each)

GE – 1

Introduction to Programming

Theory: 60 lectures

Introduction to C and C++ (5 Lectures)

History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O (10 Lectures)

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements (10 Lectures)

Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Functions and Arrays (10 Lectures)

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Derived Data Types (Structures and Unions) (5 Lectures)

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

File I/O, Preprocessor Directives

(8

Lectures)

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

Using Classes in C++

(8

Lectures)

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

Inheritance and Polymorphism

(4

Lectures)

Introduction to Inheritance and Polymorphism

Reference Books:

1. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.
2. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
3. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
4. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
5. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.

Introduction to Programming Lab

Practical: 60 lectures

1. Write a program to find greatest of three numbers.
 2. Write a program to find gross salary of a person
 3. Write a program to find grade of a student given his marks.
 4. Write a program to find divisor or factorial of a given number.
 5. Write a program to print first ten natural numbers.
 6. Write a program to print first ten even and odd numbers.
 7. Write a program to find grade of a list of students given their marks.
 8. Create Matrix class. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
 - a) Sum
 - b) Difference
 - c) Product
 - d) Transpose
-
-

GE- 2

Introduction to Database System

Theory: 60 lectures

Database: Introduction to database, relational data model, DBMS architecture, **14L**
data independence, DBA, database users, end users, front end tools

E-R Modeling: Entity types, entity set, attribute and key, relationships, relation **14L**
types, E- R diagrams, database design using ER diagrams

Relational Data Model: Relational model concepts, relational constraints, **14L**
primary and foreign key, normalization: 1NF, 2NF, 3NF

Structured Query Language: SQL queries, create a database table, create **18L**
relationships between database tables, modify and manage tables, queries, forms,
reports, modify, filter and view data.

Reference Books :

1. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
2. R. Elmasri, S. Navathe Fundamentals of Database Systems, Pearson Education, Fifth Edition, 2007
3. MySQL : Reference Manual

Introduction to Database System Lab

Practical: 60 lectures

- 1) Create a database having two tables with the specified fields, to computerize a library system of a Delhi University College.

LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price)

IssuedBooks (Accession number, Borrower)

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
 - b) Delete the record of book titled "Database System Concepts".
 - c) Change the Department of the book titled "Discrete Maths" to "CS".
 - d) List all books that belong to "CS" department.
 - e) List all books that belong to "CS" department and are written by author "Navathe".
 - f) List all computer (Department="CS") that have been issued.
 - g) List all books which have a price less than 500 or purchased between "01/01/1999" and "01/01/2004".
- 2) Create a database having three tables to store the details of students of Computer

Department in your college.

Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number)

Paper Details (Paper code, Name of the Paper)

Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
- c) List all students who live in "Delhi" and have marks greater than 60 in paper 1.
- d) Find the total attendance and total marks obtained by each student.
- e) List the name of student who has got the highest marks in paper 2.

3) Create the following tables and answer the queries given below:

Customer (CustID, email, Name, Phone, ReferrerID)

Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo)

BicycleModel (ModelNo, Manufacturer, Style)

Service (StartDate, BicycleID, EndDate)

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- b) List all the customers who have the bicycles manufactured by manufacturer "Honda".
- c) List the bicycles purchased by the customers who have been referred by customer "C1".
- d) List the manufacturer of red colored bicycles.
- e) List the models of the bicycles given for service.

4) Create the following tables, enter at least 5 records in each table and answer the queries given below.

EMPLOYEE (Person_Name, Street, City)

WORKS (Person_Name, Company_Name, Salary)

COMPANY (Company_Name, City)

MANAGES (Person_Name, Manager_Name)

- a) Identify primary and foreign keys.
- b) Alter table employee, add a column "email" of type varchar(20).
- c) Find the name of all managers who work for both Samba Bank and NCB Bank.
- d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than \$10,000.
- e) Find the names of all employees who live in the same city as the company for which they work.
- f) Find the highest salary, lowest salary and average salary paid by each company.
- g) Find the sum of salary and number of employees in each company.

- h) Find the name of the company that pays highest salary.
- 5) Create the following tables, enter at least 5 records in each table and answer the queries given below.
- Suppliers (SNo, Sname, Status, SCity)**
Parts (PNo, Pname, Colour, Weight, City)
Project (JNo, Jname, Jcity)
Shipment (Sno, Pno, Jno, Qunatity)
- Identify primary and foreign keys.
 - Get supplier numbers for suppliers in Paris with status>20.
 - Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
 - Get suppliers names for suppliers who do not supply part P2.
 - For each shipment get full shipment details, including total shipment weights.
 - Get all the shipments where the quantity is in the range 300 to 750 inclusive.
 - Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
 - Get the names of cities that store more than five red parts.
 - Get full details of parts supplied by a supplier in London.
 - Get part numbers for part supplied by a supplier in London to a project in London.
 - Get the total number of project supplied by a supplier (say, S1).
 - Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).
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GE- 3

Computer Networks and Internet Technologies

Theory: 60 lectures

Computer Networks: Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet. **6L**

8L

Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities.

4L

Transmission Media: Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation,

Satellite. **2L**

LAN Topologies: Ring, bus, star, mesh and tree topologies. **2L**

Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router. **2L**

Internet Terms: Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Web server, download and upload, online and offline. **6L**

Internet Applications: www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs. **16L**

Introduction to Web Design: Introduction to hypertext markup language (html) Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (css) for text formatting and other manipulations. **14L**

JavaScript Fundamentals: Data types and variables, functions, methods and events, controlling program flow, JavaScript object model, built-in objects and operators.

Reference Books:

1. Computer networks – Tannenbaum
2. Data Communication and Networking – Forouzan – Tata McGraw Hill.
3. D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers, Springer W. Willard, 4.HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
4. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007

Computer Networks and Internet Technologies Lab

Practical: 60 lectures

Practical exercises based on concepts listed in theory using HTML.

1. Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.
2. Create HTML document with Ordered and Unordered lists, Inserting Images, Internal and External linking
3. Create HTML document with Table:

--	--	--	--	--

			Some image here	

4. Create Form with Input Type, Select and Text Area in HTML.
5. Create an HTML containing Roll No., student's name and Grades in a tabular form.
6. Create an HTML document (having two frames) which will appear as follows:

About	This frame would show the contents according to the link clicked by the user on the left frame.
Department 1	
Department 2	
Department 3	

7. Create an HTML document containing horizontal frames as follows:

Department Names (could be along with Logos)
Contents according to the Link clicked

8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.
9. Create HTML documents (having multiple frames) in the following three formats:

Frame1
Frame2

Frame1	
Frame2	Frame3

10. Create a form using HTML which has the following types of controls:

- I. Text Box
- II. Option/radio buttons
- III. Check boxes
- IV. Reset and Submit buttons

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List of Practicals using Javascript :

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

GE-4

Information Security and Cyber Laws

Theory: 60 lectures

- Course Introduction:** Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security. **8L**
- Digital Crime:** Overview of digital crime, criminology of computer crime. **4L**
- Information Gathering Techniques:** Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking **8L**
- Risk Analysis and Threat:** Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response **10L**
- Introduction to Cryptography and Applications :** Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Caesar Cipher, Rail-Fence Cipher, Public key cryptography (Definitions only), Private key cryptography (Definition and Example) **10L**
- Safety Tools and Issues :** Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking **10L**
- Cyber laws to be covered as per IT 2008:** **10L**
- Definitions, Digital Signature And Electronic Signature
- [Section 43] Penalty and Compensation for damage to computer, computer system, etc.
 - [Section 65] Tampering with Computer Source Documents
 - [Section 66 A] Punishment for sending offensive messages through communication service, etc.
 - [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
 - [Section 66C] Punishment for identity theft
 - [Section 66D] Punishment for cheating by personation by using computer resource
 - [Section 66E] Punishment for violation of privacy
 - [Section 66F] Punishment for cyber terrorism
 - [Section 67] Punishment for publishing or transmitting obscene material in electronic form
 - [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
 - [Section 72] Breach of confidentiality and privacy

Reference Books:

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education.2005
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008

Information Security and Cyber Laws Lab

Practical: 60 lectures

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
2. Use of Password cracking tools : John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
3. Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
4. Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
5. Use nmap/zenmap to analyse a remote machine.
6. Use Burp proxy to capture and modify the message.
7. Demonstrate sending of a protected word document.
8. Demonstrate sending of a digitally signed document.
9. Demonstrate sending of a protected worksheet.
10. Demonstrate use of steganography tools.
11. Demonstrate use of gpg utility for signing and encrypting purposes.