

**Choice Based Credit System (CBCS)**

# UNIVERSITY OF DELHI

**FACULTY OF SCIENCE**

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



## **SYLLABUS OF COURSES TO BE OFFERED** **Core Courses, Elective Courses & Ability Enhancement Courses**

**Disclaimer:** The CBCS syllabus is uploaded as given by the Faculty concerned to the Academic Council. The same has been approved as it is by the Academic Council on 13.7.2015 and Executive Council on 14.7.2015. Any query may kindly be addressed to the concerned Faculty.

**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 Undergraduate Programme (B.Sc.)**

Course	*Credits	
=====		
	Theory+ Practical	Theory+Tutorials
<b><u>I. Core Course</u></b>	12X4= 48	12X5=60
<b>(12 Papers)</b>		
04 Courses from each of the		
03 disciplines of choice		
<b>Core Course Practical / Tutorial*</b>	12X2=24	12X1=12
<b>(12 Practical/ Tutorials*)</b>		
04 Courses from each of the		
03 Disciplines of choice		
 <b><u>II. Elective Course</u></b>	 6x4=24	 6X5=30
<b>(6 Papers)</b>		
Two papers from each discipline of choice		
including paper of interdisciplinary nature.		
<b>Elective Course Practical / Tutorials*</b>	6 X 2=12	6X1=6
<b>(6 Practical / Tutorials*)</b>		
Two Papers from each discipline of choice		
including paper of interdisciplinary nature		
<ul style="list-style-type: none"> <li>• <b>Optional Dissertation or project work in place of one Discipline elective paper (6 credits) in 6<sup>th</sup> Semester</b></li> </ul>		
 <b><u>III. Ability Enhancement Courses</u></b>		
<b>1. Ability Enhancement Compulsory</b>	2 X 2=4	2X2=4
<b>(2 Papers of 2 credits each)</b>		
<b>Environmental Science</b>		
<b>English/MIL Communication</b>		
<b>2. Ability Enhancement Elective</b>	4 X 2=8	4 X 2=8
<b>(Skill Based)</b>		
<b>(4 Papers of 2 credits each)</b>		
	_____	_____
	<b>Total credit= 120</b>	<b>Total credit= 120</b>

Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.

\*wherever there is practical there will be no tutorials and vice -versa

SEMESTER	COURSE OPTED	COURSE NAME	Credits
I	Ability Enhancement Compulsory Course-I	English/MIL communications/ Environmental Science	2
	Core Course-I	DSC 1A: INDUSTRIAL CHEMICALS AND ENVIRONMENT	4
	Core Course-I Practical	Industrial Chemicals and Environment	2
	Core Course-II	DSC-2A Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons	4
	Core Course-II Practical/ Tutorial	DSC 2A Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons Lab	2
	Core Course-III	DSC 3A Mathophysics Mechanics	4
	Core Course-III Practical /Tutorial	DSC 3A Mathophysics Mechanics	2
II	Ability Enhancement Compulsory Course-II	English/MIL communications/ Environmental Science	2
	Core Course-IV	DSC 1B INDUSTRIAL CHEMISTRY-FOSSIL FUELS, CLEANSING AGENTS AND FOOD ADDITIVES	4
	Core Course-IV Practical	DSC 1B INDUSTRIAL CHEMISTRY-FOSSIL FUELS, CLEANSING AGENTS AND FOOD ADDITIVES	2
	Core Course-V	DSC-2B Chemical Energetics, Equilibria & Functional Group Organic Chemistry-I	4
	Core Course-V Practical/ Tutorial	DSC-2B Chemical Energetics, Equilibria & Functional Group Organic Chemistry-I Lab	2
	Core Course-VI	DSC 3B Calculus and Matrices	6
	III	Core Course-VII	DSC 1C INDUSTRIAL CHEMISTRY- INORGANIC MATERIALS
Core Course-VII Practical		DSC 1C INDUSTRIAL CHEMISTRY- INORGANIC MATERIALS	2
Core Course-VIII		DSC 2C Solutions, Phase Equilibria, Conductance, Electrochemistry &	4

		Functional Group Organic Chemistry-II	
	Core Course-VIII Practical/Tutorial	DSC 2C Solutions, Phase Equilibria, Conductance, Electrochemistry & Functional Group Organic Chemistry-II Lab.	2
	Core Course-IX	DSC 3C ALGEBRA	6
	Skill Enhancement Course -1	SEC-1	2
IV	Core course-X	DSC 1D INDUSTRIAL CHEMISTRY-4: PHARMACEUTICALS, FERMENTATION, PESTICIDES & PERFUMES	6
	Core Course-XI	DSC 2D Chemistry of s- and p-block elements, States of matter & Chemical kinetics	4
	Course-XI Practical/Tutorial	DSC 2D Chemistry of s- and p-block elements, States of matter & Chemical kinetics Lab	2
	Core Course-XII	DSC 3D PHYSICS -2: WAVE AND OPTICS	6
	Skill Enhancement Course -2	SEC -2	2
	V	Skill Enhancement Course -3	SEC -3
	Discipline Specific Elective -1	DSE-1A	6

	Discipline Specific Elective -2	DSE-2A	6
	Discipline Specific Elective -3	DSE-3A	6
VI	Skill Enhancement Course -4	SEC -4	2
	Discipline Specific Elective -4	DSE-1B	6
	Discipline Specific Elective -5	DSE-2B	6
	Discipline Specific Elective-6	DSE-3B	6
Total Credits			120

### Details of courses

#### B.Sc. Program with Chemistry

Core papers Chemistry (Credit: 06 each) (CP 1-4):

1. Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons (4) + Lab (4)
2. Chemical Energetics, Equilibria & Functional Group Organic Chemistry-I(4) + Lab (4)
3. Conductance, Electrochemistry & Functional Group Organic Chemistry-2(4) + Lab (4)
4. Chemistry of s- and p-block elements, States of matter and Chemical Kinetics (4) + Lab (4)

**Core papers Industrial Chemistry (Credit: 06 each) (CP 1-4):**

1. INDUSTRIAL CHEMICALS AND ENVIRONMENT
2. INDUSTRIAL CHEMISTRY-FOSSIL FUELS, CLEANSING AGENTS AND FOOD ADDITIVES
3. INDUSTRIAL CHEMISTRY-INORGANIC MATERIALS
4. INDUSTRIAL CHEMISTRY-4: PHARMACEUTICALS, FERMENTATION, PESTICIDES & PERFUMES

**Core papers Mathophysics (Credit: 06 each )**

1. Mechanics
2. Calculus and matrices
3. Algebra
4. Wave and optics

**Discipline Specific Elective papers (Credit: 06 each) (DSE 1, DSE 2): Choose 2**

**Chemistry**

1. Applications of Computers in Chemistry (4) + Lab (4)
2. Analytical Methods in Chemistry (4) + Lab (4)
3. Molecular Modelling & Drug Design (4) + Lab (4)
4. Novel Inorganic Solids (4) + Lab (4)
5. Research Methodology for Chemistry (5) + Tutorials (1)
6. Chemistry of d-block elements, Quantum Chemistry and Spectroscopy (4) + Lab (4)
7. Organometallics, Bioinorganic chemistry, Polynuclear hydrocarbons and UV, IR Spectroscopy
8. Molecules of life (4) + Lab (4)
9. Dissertation

**Discipline Specific Elective papers for Industrial Chemistry:**

1. Green Chemistry (4) + Lab (4)
2. Industrial Chemicals & Environment (4) + Lab (4)
3. Polymer Chemistry (4) + Lab (4)
4. Inorganic Materials of Industrial Importance (4) + Lab (4)
- 5.
6. Dissertation

**Discipline Specific Elective papers for Mathophysics:**

Note: Universities may include more options or delete some from this list

**Skill Enhancement Course (any four) (Credit: 02 each)- SEC 1 to SEC 4**

**Chemistry**

1. IT Skills for Chemists
2. Basic Analytical Chemistry
3. Chemical Technology & Society
4. Chemoinformatics
5. Business Skills for Chemists

## 6. Analytical Clinical Biochemistry

### **Skill Enhancement Course Industrial Chemistry**

Green Methods in Chemistry

Intellectual Property Rights

Instrumental Methods of Analysis (4) + Lab (4)

### **Skill Enhancement Course Mathophysics:**

Note: Universities may include more options or delete some from this list

#### **Important:**

1. Each University/Institute should provide a brief write-up about each paper outlining the salient features, utility, learning objectives and prerequisites.
2. University can add/delete some experiments of similar nature in the Laboratory papers.
3. University can add to the list of reference books given at the end of each paper.