

Choice Based Credit System (CBCS)

UNIVERSITY OF DELHI

DEPARTMENT OF MATHEMATICS

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



SYLLABUS OF COURSES TO BE OFFERED

Skill Enhancement Course Papers for B.Sc.(H) Mathematics/ B.Sc. (Prog)/ B.A.(Prog)

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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 Undergraduate Programme (B.Sc.)

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

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

Sl. No.	CORE COURSE (12)	Ability Enhancement Compulsory Course	Skill Enhancement Course (SEC) (2)	Discipline Specific Elective DSE (6)
I			SEC-1 LaTeX and HTML	
II			SEC-2 Computer Algebra Systems and Related Softwares	
III			SEC-3 Operating System: Linux	
IV			SEC-4 Transportation and Game Theory	
V				
VI				

Skill Enhancement Course Papers

Semester-I

SEC-1 LaTeX and HTML 2L+ 2Practical per week

Elements of LaTeX; Hands-on-training of LaTeX; graphics in LaTeX; PSTricks; Beamer presentation; HTML, creating simple web pages, images and links, design of web pages.

[1] Chapter 9-11, 15

Practical

Six practical should be done by each student. The teacher can assign practical from the exercises from [1].

References:

[1] Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

[2] L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual. Addison-Wesley, New York, second edition, 1994.

Semester-II

SEC-2 Computer Algebra Systems and Related Softwares

2L+ 2P Practical per week

Use of Mathematica, Maple, and Maxima as calculator, in computing functions, in making graphs; MATLAB/Octave for exploring linear algebra and to plot curve and surfaces; the statistical software R: R as a calculator, explore data and relations, testing hypotheses, generate table values and simulate data, plotting.

[1] Chapter 12-14

Practical

Six practical should be done by each student. The teacher can assign practical from the exercises from [1].

References:

[1] Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

[2] L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual. Addison-Wesley, New York, second edition, 1994.

Semester-III

SEC-3 Operating System: Linux Linux 2L+ 2Practical per week

The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview of Linux architecture, Installation, Start up scripts, system processes (an overview), Linux Security, The Ext2 and Ext3 File systems: General Characteristics of, The Ext3 File system, file permissions. User Management: Types of users, the powers of Root, managing users (adding and deleting): using the command line and GUI tools. Resource Management in Linux: file and directory management, system calls for files Process Management, Signals, IPC: Pipes, FIFOs, System V IPC, Message Queues, system calls for processes, Memory Management, library and system calls for memory.

References:

- [1] Arnold Robbins, Linux Programming by Examples The Fundamentals, 2nd Ed., Pearson Education, 2008.
- [2] Cox K, Red Hat Linux Administrator's Guide, PHI, 2009.
- [3] R. Stevens, UNIX Network Programming, 3rd Ed., PHI, 2008.
- [4] Sumitabha Das, Unix Concepts and Applications, 4th Ed., TMH, 2009.
- [5] Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, Linux in a Nutshell, 6th Ed., O'Reilly Media, 2009.
- [6] Neil Matthew, Richard Stones, Alan Cox, Beginning Linux Programming, 3rd Ed., 2004.

Semester-IV

SEC-4 Transportation and Game Theory **2L+ 1 Tutorial per week**

Transportation problem and its mathematical formulation, northwest-corner method least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem. Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure.

References:

- [1] Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004.
- [2] F. S. Hillier and G. J. Lieberman, Introduction to Operations Research,- concepts and cases 9th Ed., Tata McGraw Hill, 2010.
- [3] Hamdy A. Taha, Operations Research, An Introduction, Prentice- Hall, 9th Ed., 2010.