Scheme of Studies and Examinations, and the Syllabi

for

Under Graduate Degree Programme

Bachelor of Computer Applications
(Data Science)

(in phased manner)

as per NEP-2020 guidelines

With Multiple Entry-Exit and Internship
w.e.f. Academic Session 2024-25

DEPARTMENT OF COMPUTER APPLICATIONS - UG

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)
Bachelor of Computer Applications (DS) Semester – I

Course Code	Course Title	Period(s) L	T	P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-101A	Foundations of Computer Science	3	0	0	3	3	40	60	100	3
BCA-103A	Digital Logic Design	3	0	0	3	3	40	60	100	3
ASH-MAT-115A	Basics of Mathematics-I	2	0	0	2	2	40	60	100	3
Value Added Course (VAC)										
ASH-HUM-107A	Universal Human Values	2	0	0	2	2	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-105A	Problem Solving through C	3	0	0	3	3	40	60	100	3
Ability Enhancement Course (AEC)										
ASH-HUM-117A	English Language and Communication-1	2	0	0	2	2	40	60	100	3
Multi Disciplinary Course (MDC)										
BBA-215A	Digital Marketing	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-171A	Digital Logic Design Lab	0	0	4	4	2	50	50	100	3
BCA-173A	Problem Solving through C Lab	0	0	4	4	2	50	50	100	3
Total		17	0	8	25	21	380	520	900	

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)
Bachelor of Computer Applications (DS) Semester – II

Course Code	Course Title	Period(s) L	T	P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-102A	Operating System	3	0	0	3	3	40	60	100	3
BCA-122A	Programming with Python	3	0	0	3	3	40	60	100	3
BCA-124A	Office and Spreadsheet Tools	2	0	0	2	2	40	60	100	3
ASH-MAT-116A	Basics of Mathematics-II	2	0	0	2	2	40	60	100	3
Value Added Course (VAC)										
BT-CE-104A	Environmental Studies	2	0	0	2	2	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-106A	Introduction to Web Technology	3	0	0	3	3	40	60	100	3
Ability Enhancement Course (AEC)										
ASH-HUM-118A	English Language and Communication-2	2	0	0	2	2	40	60	100	3
Multi Disciplinary Course (MDC)										
ASH-HUM-119A	Indian Knowledge System	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-192A	Programming with Python Lab	0	0	4	4	2	50	50	100	3
BCA-194A	Office and Spreadsheet Tools Lab	0	0	4	4	2	50	50	100	3
BCA-174A	Web Technology Lab	0	0	4	4	2	50	50	100	3
Total		19	0	12	31	25	470	630	1100	
Grand Total (Exit with 1 year Certificate)		36	0	20	56	50	950	1150	2100	

Note 1: The Industrial Internship shall be of 4 credits duration of 45-60 days after the 2nd semester. If a student takes exit after 2nd semester with **Under Graduate Certificate in Computer Applications (Data Sceince)**, marks of Industrial Internship shall be counted in 2nd semester itself.

	Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)									
	Bachelor of Computer Applications (DS) Semester – III									
Course Code	**Course Title**	**Period(s)**			**Hours/ Week**	**Credit(s)**	**Continuous Internal Examination**	**Semester End Examination**	**Total Marks**	**Duration of Exam (Hours)**
							(CIE)	**(SEE)**	**(CIE+SEE)**	
		L	**T**	**P**			**Max**	**Max**	**Max**	
	Core Course (CC)									
ASH-MAT-215A	Probability and Statistics	3	0	0	3	3	40	60	100	3
BCA-112A	Data Structures using C++	3	0	0	3	3	40	60	100	3
BCA-203A	Database Management System	3	0	0	3	3	40	60	100	3
BCA-221A	Introduction to Data Science	3	0	0	3	3	40	60	100	3
	Skill Enhancement Course (SEC)									
BCA-223A	Fundamentals of R Programming	3	0	0	3	3	40	60	100	3
	Ability Enhancement Course (AEC)									
BBA-217A	Personality Development	2	0	0	2	2	40	60	100	3
	Practicum Course (PC)									
BCA-271A	Data Structures Lab	0	0	4	4	2	50	50	100	3
BCA-273A	Database Management System Lab	0	0	4	4	2	50	50	100	3
BCA-291A	R Programming Lab	0	0	4	4	2	50	50	100	3
	Total	17	0	12	29	23	390	510	900	

	Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)									
	Bachelor of Computer Applications (DS) Semester – IV									
Course Code	**Course Title**	**Period(s)**			**Hours/ Week**	**Credit (s)**	**Continuous Internal Examination**	**Semester End Examination**	**Total Marks**	**Duration of Exam (Hours)**
							(CIE)	**(SEE)**	**(CIE+SEE)**	
		L	**T**	**P**			**Max**	**Max**	**Max**	
	Core Course (CC)									
BCA-222A	Statistical Foundation for Data Science	3	0	0	3	3	40	60	100	3
BCA-224A	Data Mining and Warehousing	3	0	0	3	3	40	60	100	3
BCA-226A	Data Visualization using Python	3	0	0	3	3	40	60	100	3
	Value Added Course (VAC)									
BCA-202A	Quantitative Aptitude	2	0	0	2	2	40	60	100	3
	Skill Enhancement Course (SEC)									
BCA-215A	Full Stack Development-1 (MERN)	3	0	0	3	3	40	60	100	3
	Discipline specific Elective Course (DSE)									
BCA-266A	Elective-I	3	0	0	3	3	40	60	100	3
	Practicum Course (PC)									
BCA-292A	Data Mining and Warehousing Lab	0	0	4	4	2	50	50	100	3
BCA-294A	Data Visualization using Python Lab	0	0	4	4	2	50	50	100	3
BCA-274A	Full Stack Development-1 (MERN) Lab	0	0	4	4	2	50	50	100	3
	Total	17	0	12	29	23	390	510	900	
	Grand Total (Exit with 2 years Diploma)	70	0	44	114	96	1730	2170	3900	

Note 2: The Industrial Internship shall be of 4 credits duration of 45-60 days after the 4th semester. If a student takes exit after 4th semester with **Under Graduate Diploma in Computer Applications (Data Science)**, marks of Industrial Internship (either done after 2nd or 4th semester) shall be counted in 4th semester itself.

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)										
Bachelor of Computer Applications (DS) Semester – V										
Course Code	Course Title	Period(s)			Hours/ Week	Credit(s)	Continuous Internal Examination	Semester End Examination	Total Marks	Duration of Exam (Hours)
							(CIE)	(SEE)	(CIE+SEE)	
		L	T	P			Max	Max	Max	
Core Course (CC)										
BCA-212A	Data Communication and Computer Networks	3	0	0	3	3	40	60	100	3
BCA-321A	Data Privacy and Ethics	3	0	0	3	3	40	60	100	3
BCA-323A	Big Data Analytics	3	0	0	3	3	40	60	100	3
Discipline specific Elective Course (DSE)										
BCA-363A	Elective-II	3	0	0	3	3	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-371A	Seminar	0	0	2	2	1	100		100	3
Practicum Course (PC)										
BCA-391A	Big Data Analytics Lab	0	0	4	4	2	50	50	100	3
BCA-393A	Elective-II Lab	0	0	4	4	2	50	50	100	3
Industrial Internship (INTR)										
BCA-377A	Industrial Internship	0	0	0	0	4	100		100	3
Total		12	0	10	22	21	460	340	800	

Note 3: If a student pursues 3 years UG Programme without taking Exit option, the Industrial Internship (either done after 2nd or 4th semester) will be taken into account in 5th semester.

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)										
Bachelor of Computer Applications (DS) Semester – VI										
Course Code	Course Title	Period(s)			Hours/ Week	Credit(s)	Continuous Internal Examination	Semester End Examination	Total Marks	Duration of Exam (Hours)
							(CIE)	(SEE)	(CIE+SEE)	
		L	T	P			Max	Max	Max	
Core Course (CC)										
BCA-322A	Business Intelligence and Analytics	3	0	0	3	3	40	60	100	3
BCA-324A	Cloud Services for Data Analytics	3	0	0	3	3	40	60	100	3
Discipline specific Elective Course (DSE)										
BCA-366A	Elective-III	3	0	0	3	3	40	60	100	3
Skill Enhancement Course (SEC)										
BBA-304A	Entrepreneurship and Startups	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-392A	Business Intelligence and Analytics Lab	0	0	4	4	2	50	50	100	3
BCA-394A	Cloud Services for Data Analytics Lab	0	0	4	4	2	50	50	100	3
BCA-376A	Minor Project	0	0	8	8	4	50	50	100	3
Total		11	0	16	27	19	310	390	700	
Grand Total (Exit with 3 years Degree)		93	0	70	163	132	2400	2900	5300	

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)
Bachelor of Computer Applications (DS) Semester – VII (Honours)

Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
		L	T	P						
Honour Course (HC)										
BCA-451A	Design and Analysis of Algorithm	3	0	0	3	3	40	60	100	3
BCA-465A	Elective-IV	3	0	0	3	3	40	60	100	3
Value Added Course (VAC)										
BT-ME-112A	Design Thinking and Innovation	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-471A	Design and Analysis of Algorithm Lab	0	0	4	4	2	50	50	100	3
BCA-473A	Major Project-1	0	0	20	20	10	50	50	100	3
Total		8	0	24	32	20	220	280	500	

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)
Bachelor of Computer Applications (DS) Semester – VIII (Honours)

Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
		L	T	P						
Honour Course (HC)										
BCA-466A	Data Visualization using Tableau	3	0	0	3	3	40	60	100	3
BCA-468A	Elective-V	3	0	0	3	3	40	60	100	3
Practicum Course (PC)										
BCA-492A	Data Visualization using Tableau Lab	0	0	4	4	2	50	50	100	3
BCA-474A	Major Project-2	0	0	20	20	10	50	50	100	3
Total		6	0	24	30	18	180	220	400	
Grand Total (4 years Honours Degree)		107	0	118	225	170	2800	3400	6200	

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)									
Bachelor of Computer Applications (DS) Semester – VII (Honours with Research)									
Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination	Semester End Examination	Total Marks	Duration of Exam (Hours)
							(CIE)	(SEE)	(CIE+SEE)	
		L	T	P			Max	Max	Max	
Honour Course (HC)										
BCA-455A	Research Methodology	3	0	0	3	3	40	60	100	3
BCA-467A	Elective-IV	3	0	0	3	3	40	60	100	3
Value Added Course (VAC)										
BT-ME-112A	Design Thinking and Innovation	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-491A	Elective-IV Lab	0	0	4	4	2	50	50	100	3
BCA-473A	Major Project-1	0	0	20	20	10	50	50	100	3
Total		8	0	24	32	20	220	280	500	

Scheme of Studies and Examinations (w.e.f. Session 2024 - 2025)									
Bachelor of Computer Applications (DS) Semester – VIII (Honours with Research)									
Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination	Semester End Examination	Total Marks	Duration of Exam (Hours)
							(CIE)	(SEE)	(CIE+SEE)	
		L	T	P			Max	Max	Max	
Practicum Course (PC)										
BCA-476A	Dissertation	0	0	36	36	18	100	100	200	3
Total		0	0	36	36	18	100	100	200	
Grand Total (4 years Honours with Research Degree)		101	0	130	231	170	2720	3280	6000	

Abbreviations Used:

Abbreviation	Full Form	Description
CC	**Core Course**	Compulsory core course for the programme, CC will be a theory course of 3 credits
PC	**Practicum Course**	Compulsory practical course (software lab) of 2 credits
INTR	**Industrial Internship**	• A student can do industrial internship of 45-60 days duration after the 2nd or 4th semester. It will be of 4 credits. • If a student pursues 3 year UG Programme without taking Exit option, this internship (either done after 2nd or 4th semester) will be taken into account in 5th semester. • If a student takes Exit after 2 years in UG Programme, this internship (either done after 2nd or 4th semester) will be taken into account in 4th semester. • If a student takes Exit after 1 year in UG Programme, the mandatory internship done after 2nd semester will be taken into account in 2nd semester.
SEC	**Skill Enhancement Course**	These courses aim at imparting knowledge, practical skills, hands-on training and competencies, soft skills, etc. to enhance the employability of students.

AEC	**Ability Enhancement Courses**	These courses aim at enabling the students to achieve competency in the English language with special emphasis on communication skills.
VAC	**Value-Added Course**	This course aims to instil in students (i) Universal Human Values, (ii) Environmental Studies (iii) Quantitative Aptitude.
MDC	**Multi-Disciplinary Course**	These courses are based on introductory knowledge in a subject which is different from the main discipline of study to gain knowledge across the disciplines. Students are not allowed to choose or repeat courses already undergone at the Senior Secondary Level (Class XII) or disciplines of study under this category. Provided further that if a Multidisciplinary Course (MDC) across the discipline cannot be offered by a Department/ Institute, due to its constraints and available resources, then i) A subject from the same discipline can be offered as a MDC course if that subject also belongs to the list of subjects of some other discipline. ii) MDC can be opted out of Massive Open Online Courses (MOOCs) from **NPTEL, SWAYAM**. It shall be of minimum 2 credits.
DSE	**Discipline-specific Elective Course**	A discipline-specific elective course is a course aimed at imparting options for varied knowledge and skills in the specialized fields of a discipline/subject.
HC	**Honour Course**	An honour course in the 4th year of the Honours or Honours with Research Degree Programme.

List of Discipline-specific Elective Courses:

Elective No.	Semester	Course Code	Elective Course Name
Elective-I	IV	BCA-266A(i)	Artificial Intelligence
		BCA-266A(ii)	Internet of Things
Elective-II	V	BCA-363A(i)	Machine Learning
		BCA-363A(ii)	Image Processing
Elective-III	VI	BCA-366A(i)	Software Engineering
		BCA-366A(ii)	Time Series Analysis
Elective-IV	VII (Honours)	BCA-465A(i)	Introduction to Deep Learning
		BCA-465A(ii)	Natural Language Processing
	VII (Honours with Research)	BCA-467A(i)	Introduction to Deep Learning
		BCA-467A(ii)	Natural Language Processing
Elective-V	VIII (Honours)	BCA-468A(i)	Web Mining
		BCA-468A(ii)	Cryptography and Network Security

Note 4: Relative weightage of Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), criteria of passing marks, evaluation procedure, and other guidelines are as per the Ordinance of Under Graduate Degree Programmes: Bachelor of Computer Applications, Bachelor of Computer Applications (Cloud Technology and Information Security), Bachelor of Computer Applications (Data Science).