SHRI GURU RAM RAI UNIVERSITY

[Estd. by Govt. of Uttarakhand, vide Shri Guru Ram Rai University Act no. 03 of 2017 & recognized by UGC u/s (2f) of UGC Act 1956]

SYLLABUS

Certificate in Computer Science -1 years

Diploma in Computer Science - 2years

Bachelor of Science (Computer Science) - 3years

Bachelor of Science (Computer Science) Honors with Research/ Academic Project /Entrepreneurship- 4 years

Under CBCS Pattern as per NEP 2020

School of Computer Application & Information Technology

(w.e.f. 2023 Session)

Eligibility for Admission:

For Admission in first year of B.SC Computer Science candidate should possess Intermediate or equivalent in any discipline/stream with math's as a subject in class (10+2) from any recognized board with minimum 50%

As NEP 2020 has been implemented from 2022 following nomenclature have been introduced in B.SC (H)CS Honors -3year degree programme and B.SC (H)CS –Honors 4 year degree programme .

However for entry into B.Sc(H)CS – 4Years (Honors with Research/Academic / Entrepreneurship minimum percentage of six semesters should be 75%..

EXIT POLICY & CREDIT EARN PROGRESSION POLICY

S.NO	Name of Course	Duration	Remarks
1	Certificate in Computer Science	1 Year 2semesters	If any student opt to exit after completing 1st year (44 credits) + 4 credits for summer internship/Apprentice/Vocational course during summer vacations. These students are allowed to renter the degree program within three years and complete the degree with in stipulated maximum period of seven years.
2	Diploma in Computer Science	2 Years 4 semester	If any student opt to exit after completing 2nd year i.e will complete Four semesters =Total 2 years with 88 credits + 4 credits for summer internship/Apprentice/Vocational course during summer vacations. These students are allowed to renter the degree program within three years and complete the degree with in stipulated maximum period of seven years.
3	Under Graduate Degree of Bachelor of Science (Computer Science)	3 Years	Student who wishes to undergo 3 year UG program B.Sc. (H) CS in the after completing 3 years securing with total 132 credits

5	Under Graduate Degree of Bachelor of Science-Honors (Computer Science) with Research/ Academic Project/ Entrepreneurship	4 Years	If candidates completes 4 year i.e. will complete 8 semesters with minimum credits of 176 credits. Note:- For entering into B.Sc CS(Honors with research) 4th year candidate should have **75% overall up to 6th semester**

EXAMINATION SCHEME

1. Internal assessment of each course will be of **30 marks** and will be done by School of CA & IT through internal assessment examination ,assignment ,Attendance and Teacher Assessment
2. External assessment of each course will be of 70 marks and will be done through University examination.
3. No External assessment of Co-curricular course as such course is Grade based.

INTERNAL ASSESSMENT [30 MARKS]

Total Internal Assessment =30 marks

Internal Assessment Examination =15 marks **[CO1,CO2,CO3]**
Teacher Assessment =5 marks **[CO4, CO5, CO6]**
Attendance=5 Marks
Assignment=05Marks

SCHEME OF INTERNAL EXAMINATION QUESTION PAPER

SECTION	NO OF QUESTONS AND MARKING	Marks	QUESTION NUMBERING PATTERN	COURSE OUTCOME NUMBER
Section A	5 Q each 1 marks	5 Marks	1a to 1e	All CO1
Section B	2 Question each 2.5 marks	5 marks	2a or 2a 2b or 2b	All CO2
Section C	1 Question 5 marks	5 marks	3a or 3b	All CO3

Program Outcome (PO)
for
Certificate in Computer Science-1 year
Diploma in Computer Science - 2years
Bachelor of Science (Computer Science) - 3years
Bachelor of Science (Computer Science) Honors with Research/ Academic Project/Entrepreneurship- 4years

PROGRAMME OUTCOMES (POS):

It is envisioned that the graduated students of B.Sc. (Computer Science) degree, will be able to possess following Attributes and demonstrate related competencies:-

PO1	Computational knowledge	Acquire knowledge of Computing (algorithm and Coding) &Computing Specialization and Domain Knowledge of proper computing models for defined problems.
PO2	Problem analysis	Identify, formulate and analyze complex computational problems using mathematics, computer science concepts and relevant domains.
PO3	Design/development of solutions	Ability to design efficient solution for complex, real-life problem, system software or Application Software as per needs and specifications of customers.
PO4	Conduct investigations of complex computing problems	Use research-based knowledge and research methods including design of experiments, analysis & interpretation of data & synthesis of information to reach valid conclusions.
PO5	Modern Tool Usage	Ability to demonstrate skills to use modern technologies and tools to analyze and solve the software development problems.
PO6	Professional Ethics	Ability to perform professional practices in an ethical way, keeping in the mind cyber regulations, laws, Intellectual Property Right and norms of professional computing practices.
PO7	Life-Long Learning	Ability to develop confidence and ability for self-education and life-long learning in the broadest context of technological change. Ability to adapt or change the acquired knowledge with change in the technology.
PO8	Project management	Ability to demonstrate knowledge & understanding the

	and finance	Software engineering management principles and apply them as a member & as a leader in a team to manage multidisciplinary projects. Ability to make budget, make estimates of time, effort, time and analyse risk and reschedule the projects accordingly.
PO9	Communication Efficacy	Ability to effectively communicate with the technical community and with the society about complex computing activities in both verbal and written form, design documents, letters, make effective presentations.
PO10	Societal and Environmental Concern	Ability to understand the impact of IT solutions in a global and societal context. Ability to apply all concepts of green computing to preserve environment and use IT resources in an effective and optimized way.
PO11	Individual and Team Work	Ability to work multi-disciplinary team both as a member and leader, as per need. To develop the leadership and managerial skills in the student.
PO12	Innovations and entrepreneurship	Ability to apply innovation and promote innovative ideas to a suitable opportunity to create value and wealth for the betterment of the individual and society at large.

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
Certificate in Computer Science

FIRST SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BCSDSC101	Web Programming	3		-	3	30	70	100
2	Discipline Specific Core	BCSDSC102	Programming in 'C'	3		-	3	30	70	100
3	Discipline Specific Core	BCSDSC103	System Analysis & Design	3	1	-	4	30	70	100
4	**General Elective**	BCSGE101	Fundamental of Computer & Information Technology.	3	1	-	4	30	70	100
5	**Skill Enhancement Course**	BCSSC101	Statistics	2	-	-	2	30	70	100
6	**Ability Enhancement Course**	AEC1	Environmental Studies- I	2	-	-	2	30	70	100
7	**Value Addition Course**	CITV-101	Computer Ethics	2			2	30	70	100
Practical										
8	Discipline Specific Core	BCSDSCP11	Lab Web Programming	-	-	2	1	30	70	100
9	Discipline Specific Core	BCSDSCP12	Lab Programming in C	-	-	2	1	30	70	100
Total				**18**	**2**	4	**22**	**270**	**630**	**900**

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
Under Graduate Certificate in Computer Science

SECOND SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BCSDSC201	Operating System	3		-	3	30	70	100
2	Discipline Specific Core	BCSDSC202	Data structure using 'C'	3		-	3	30	70	100
3	Discipline Specific Core	BCSDSC203	Artificial Intelligence	3	1	-	4	30	70	100
4	**General Elective**	BCSGE201	Programming Paradigm and Internet Technologies	3	1	-	4	30	70	100
5	**Skill Enhancement Course**	BCSSC201	Cyber Security	2	-	-	2	30	70	100
6	**Ability Enhancement Course**	AEC2	English Communication I : Listening and Speaking Skills	2	-	-	2	30	70	100
7	**Value Addition Course**	CITVC201	The Art of Clean Code	2			2	30	70	100
8	Discipline Specific Core	BCSDSCP21	Lab Operating System	-	-	2	1	30	70	100
9	Discipline Specific Core	BCSDSCP22	Lab Data Structure	-	-	2	1	30	70	100
			Total	**18**	**2**	**4**	**22**	**2**	4	**22**
Exit option with **Certificate in Computer Science** (with the completion of courses) equivalent to a minimum of **44 credits** + **4 credits through summer internship /Apprentice**				**Total Credits (I^{st} & II^{nd} Sem)**			**44**	**Total Marks (I^{st} & II^{nd} Sem)**		**1800**

STUDY & EVALUATION SCHEME

CHOICE BASED CREDIT SYSTEM (CBCS) Diploma in Computer Science

THIRD SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BCSDSC301	DBMS	3	-	-	3	30	70	100
2	Discipline Specific Core	BCSDSC302	Python Programming	3	-	-	3	30	70	100
3	Discipline Specific Core	BCSDSC303	Computer Network	3	1	-	4	30	70	100
4	**General Elective**	BCSGE301	Multimedia system	3	1	-	4	30	70	100
5	**Skill Enhancement Course**	BCSSC301	Verbal and Non Verbal Reasoning	2	-	-	2	30	70	100
6	**Ability Enhancement Course**	AEC-3	Environmental Studies – II	2	-	-	2	30	70	100
7	**Value Addition Course**	CITVC301	Digital Empowerment	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BSCDSCP31	Lab DBMS	-	-	2	1	30	70	100
9	Discipline Specific Core	BSCDSCP32	Lab Python	-	-	2	1	30	70	100
			Total	**18**	**2**	**4**	**22**	**270**	**630**	**900**

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
Diploma in Computer Science

FOURTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific Core	BCSDSC401	JAVA Programming	3	-	-	3	30	70	100
2	Discipline Specific Core	BCSDSC402	Advance DBMS with PL/SQL	3	-	-	3	30	70	100
3	Discipline Specific Core	BCSDSC403	Digital Electronics	3	1	-	4	30	70	100
4	**General Elective**	BCSGE401	Software Engineering	3	1	-	4	30	70	100
5	**Skill Enhancement Course**	BCSSC401	Quantitative & Numerical Aptitude	2	-	-	2	30	70	100
6	**Ability Enhancement Course**	AEC4	English Communication -II : Reading and Writing Skills	2	-	-	2	30	70	100
7	**Value Addition Course**	CITVC401	Challenges in Programming	2	-	-	2	30	70	100
Practical										
8	Discipline Specific Core	BCSDSCP41	Lab JAVA Programming	-	-	2	1	30	70	100
9	Discipline Specific Core	BCSDSCP42	Lab PL/SQL	-	-	2	1	30	70	100
			Total	**18**	**2**	**4**	**22**	**270**	**630**	**900**
Exit option with **Diploma in Computer Science** (with the completion of courses) equivalent to a minimum of **88 credits + 4 credits through summer internship /Apprentice**				**Total Credits (I^{st} to IV^{th} Semester)**			**88**	**Total Marks (I^{st} to IV^{th} Semester)**		**3600**

STUDY & EVALUATION SCHEME

CHOICE BASED CREDIT SYSTEM (CBCS) B.Sc. (Computer Science)

FIFTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BCSDSC501	PHP Programming	3		-	3	30	70	100
2	Discipline Specific Core	BCSDSC502	C# . NET	3	-	-	3	30	70	100
3	Discipline Specific Core	BCSDSC503	Analysis Design of Algorithm	3	1	-	4	30	70	100
4	General Elective	BCSGE501	Management Information System	3	1	-	4	30	70	100
5	Discipline Specific Elective	BCSDSE504A	IOT / MOOC	3	1	-	4	30	70	100
		BCSDSE504B	Cloud Computing / MOOC							
		BCSDSE504C	Software Testing / MOOC							
Practical										
6	**(Internship/Apprenticeship / Project/ Community Outreach) (IAPC)**	BCSSM5	Seminar	-	-	-	2	30	70	100
7	Discipline Specific Core	BCSDSCP51	Lab PHP Programming	-	-	2	1	30	70	100
8	Discipline Specific Core	BCSDSCP52	Lab C# . NET	-	-	2	1	30	70	100
			Total	**15**	**3**	**4**	**22**	**240**	**560**	**800**

Note: MOOC (min 4 weeks) (SWAYAM/NPTEL)

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
B.Sc. (Computer Science)

SIXTH SEMESTER:

S. No.	Course Category	Course Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Internal	External	
Theory										
1	Discipline Specific Core	BCSDSC601	Android Programming	3	-	-	3	30	70	100
2	Discipline Specific Core	BCSDSC 602	Unix & Shell Programming	3		-	3	30	70	100
3	Discipline Specific Core	BCSDSC603	Graph Theory	3	1	-	4	30	70	100
4	General Elective	BCSGE601	Operation Research	3	1	-	4	30	70	100
5	Discipline Specific Elective	BCSDSE 604A	Computer Graphics / MOOC	3	1	-	4	30	70	100
		BCSDSE604B	CBNST / MOOC							
		BCSDSE604C	Theory of Computation / MOOC							
6	**(Internship/Apprenticeship / Project/ Community Outreach) (IAPC)**	BCSPR605	Academic Project	-	-	-	2	30	70	100
Practical										
7	Discipline Specific Core	BSCDSCP61	Lab Android Programming	-	-	2	1	30	70	100
8	Discipline Specific Core	BSCDSCP62	Lab Unix & Shell Programming	-	-	2	1	30	70	100
			Total	**15**	**3**	**4**	**22**	**240**	**560**	**800**
Exit option with **Bachelor Degree in Computer Science -** (with the completion of courses) equivalent to a minimum of **132 credits**				**Total Credits (I^{st} to VI^{th} Semester)**			**132**	**Total Marks I^{st} to VI^{th} Semester))**		**5200**

Note: MOOC (min 4 weeks) (SWAYAM/NPTEL

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
B.Sc. - Computer Science (Honors)
(with research/Academic Project/Entrepreneurship)

SEVENTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific core	BCSDSC701	Data Science using Python	3	-	-	3	30	70	100
2	Discipline Specific Elective	BCSDSE702A	Research Methodology	3	1	-	4	30	70	100
		BCSDSE702B	Software Project Management - 1							
		BCSDSE702C	Entrepreneurship Management - 1							
3	Discipline Specific Elective	BCSDSE703A	Data Ware Housing & Data Mining / MOOC	4	-	-	4	30	70	100
		BCSDSE703B	Compiler Design / MOOC							
4	Discipline Specific Elective	BCSDSE704A	Big Data / MOOC	4	-	-	4	30	70	100
		BCSDSE704B	Network Security & Cryptography / MOOC							
Practical										
5	Major/Core	BCSDSCP71	Data Science Lab	-	-	2	1	30	70	100
6	Project	BCSDSCPR7	Dissertation on Academic Project/ Entrepreneurship	-	-	12	6	30	70	100
			Total	**14**	**1**	**14**	**22**	**180**	**420**	**600**

Note: MOOC (min 4 weeks) (SWAYAM/NPTEL

STUDY & EVALUATION SCHEME
CHOICE BASED CREDIT SYSTEM
(CBCS)
B.Sc. - Computer Science (Honors)
(with research/Academic Project/Entrepreneurship)

EIGHTH SEMESTER:

S. No.	Course Category	Couse Code	Course Name	Periods				Evaluation scheme		Subject Total
				L	T	P	C	Sessional (Internal)	External (ESE)	
Theory										
1	Discipline Specific core	BCSDSC801	Microprocessor using 8085	3	-	-	3	30	70	100
2	Discipline Specific Elective	BCSDSE802A	Research Publication & Ethics	3	1	-	4	30	70	100
		BCSDSE802B	Software Project Management – 2							
		BCSDSE802C	Entrepreneurship Management - 2							
3	Discipline Specific Elective	BCSDSE803A	Machine Learning / MOOC	4	-	-	4	30	70	100
		BCSDSE803B	Blockchain Technology / MOOC							
4	Discipline Specific Elective	BCSDSE804A	Digital Image Processing / MOOC	4	-	-	4	30	70	100
		BCSDSE804B	Advance Computer Networks / MOOC							
Practical										
5	Major/Core	BCSDSC-P81	Lab Microprocessor	-	-	2	1	30	70	100
6	Project	BCSPR8	Dissertation on Major/Minor OR Research/ Academic Project/ Entrepreneurship	-	-	12	6	30	70	100
			Total	**14**	**1**	**16**	**22**	**180**	**420**	**600**
Exit Option with **Bachelor Degree in Computer Science (Honors with Research/ Academic Project / Entrepreneurship)** with completion of courses equivalent to a minimum of 176 credits.				**Total Credits (Ist to VIIIth Sem)**			**176**	**Total Marks (Ist to VIIIth Sem)**		**6400**

Note: MOOC (min 4 weeks) (SWAYAM/NPTEL)