

School of Engineering and Technology

CURRICULUM & SYLLABI

COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B.Tech CSE (AI & ML) 2025

B.Tech Program Code – BTCS2024

Total Credits 164

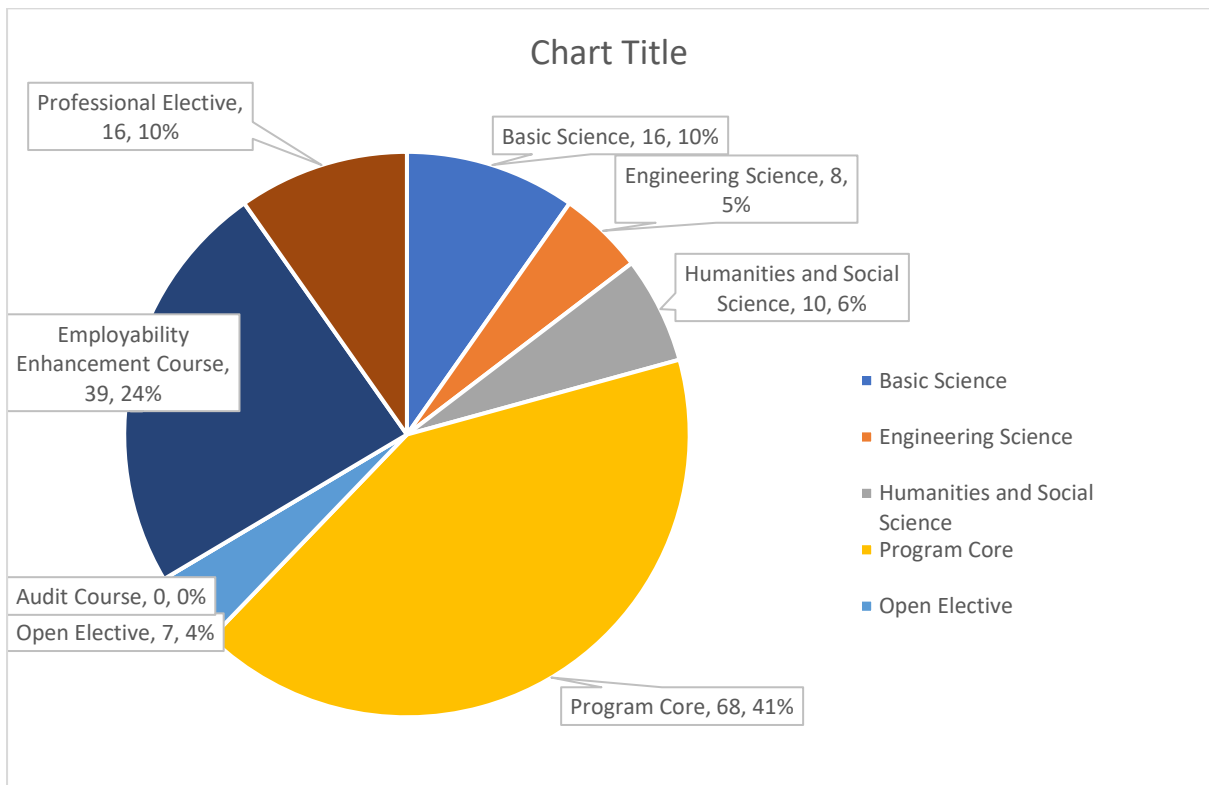
Effective from A.Y : 2025-2026



Shri Guru Ram Rai University, Dehradun

Course Structure and Credit Distribution

Basic Science	Engineering Science	Humanities and Social Science	Program Core	Open Elective	Audit Course	Employability Enhancement Course	Professional Elective
16	8	10	68	7	0	39	16



General Course Structure and Theme:

Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Lecture (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

Course Code and Definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
C	Credits
HS	Humanities & Social Science Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Professional Elective Courses
OE	Open Elective Courses
AU	Audit Courses
EEC	Employment Enhancement Courses (Project/Summer Internship/Seminar)

CATEGORY WISE COURSES

HUMANITIES AND SOCIAL SCIENCE COURSES [HS]

SNo	Course Code	Course Title	Credits
1	HS101	Communication Skills	2
	HSP13	Communication Skills Lab	1
2	HS102	Design Thinking	2
	HSP14	Design Thinking Lab	1
3	HS201	Universal Human Values: Understanding Harmony and Ethical Human Conduct	1
4	HS401	Theory of Computational Ecosystem	3
Total Credits			10

BASIC SCIENCE COURSES [BS]

SNo	Course Code	Course Title	Credits
1	BS101	Physics	3
	BSP11	Physics Lab	1
2	BS102	Mathematics – I	4
3	BS201	Mathematics – II	4
4	BS202	Chemistry	3
	BSP21	Chemistry Lab	1
Total Credits			16

ENGINEERING SCIENCE COURSES [ES]

SNo	Course Code	Course Title	Credits
1	ES101	Problem Solving and Programming using C	3
	ESP12	Problem Solving and Programming using C Lab	1
2	ES102	Mathematical Concepts for AI	4
Total Credits			8

PROGRAM CORE COURSES [PC]

SNo	Course Code	Course Title	Credits
1	PC201	Object Oriented Programming Using Python	3
	PCP22	Object Oriented Programming Using Python Lab	1
2	PC202	Data Structures	3
	PCP23	Data Structures Lab	1
3	PC203	Discrete Mathematical Structures	2
4	PC204	Computer Organization and Architecture	3
5	PC301	Design and Analysis of Algorithm	3
	PCP31	Design and Analysis of Algorithm Lab	1
6	PC302	Database Systems	3
	PCP32	Database Systems Lab	1
7	PC303	Computer Networks	3
	PCP33	Computer Networks Lab	1
8	PC304	Introduction to Machine Learning	3
	PCP34	Introduction to Machine Learning Lab	1
9	PC305	Artificial Intelligence	3
10	PC401	Theory of Computation	4
11	PC402	Software Engineering	3
	PCP41	Software Engineering Lab	1
12	PC403	Foundations of Deep Learning	3
	PCP42	Foundations of Deep Learning Lab	1
13	PC404	Operating System	3
	PCP43	Operating System Lab	1
14	PC501	Data and Visual Analytics in AI	3
	PCP51	Data and Visual Analytics in AI Lab	1
15	PC502	Natural Language Processing	3
	PCP52	Natural Language Processing Lab	1
16	PC503	Advanced Machine Learning	3
	PCP53	Advanced Machine Learning Lab	1
17	PC504	Optimization Techniques in Machine Learning	4
18	PC601	Soft Computing	3
	PCP61	Soft Computing Lab	1
Total Credits			68

PROFESSIONAL ELECTIVE COURSES [PE]

SNo	Course Code	Course Title	Credits
1	PE601	Professional Elective I	3
	PEP62	Professional Elective I Lab	1
2	PE602	Professional Elective II	3

	PEP63	Professional Elective II Lab	1
3	PE701 PEP71	Professional Elective III Professional Elective III Lab	3 1
4	PE702 PEP72	Professional Elective IV Professional Elective IV Lab	3 1
Total Credits			16

OPEN ELECTIVE COURSES [OE]

SNo	Course Code	Course Title	Credits
1	OE301 OEP35	Open Elective I Open Elective I Lab	2 1
2	OE601 OEP64	Open Elective II Open Elective II Lab	3 1
Total Credits			7

AUDIT COURSES [AU]

SNo	Course Code	Course Title	Credits
1	AU401	Environmental Science	0
2	AU501	Indian Constitution	0
Total Credits			0

EMPLOYMENT ENHANCEMENT COURSE [EEC]

Project Work & Internship in Industry/Research Institution

SNo	Course Code	Course Title	Credits
1	EECP44	Minor Project	3
2	EECP54	Minor Project	4
3	EECP65	Capstone Project (Part I)	6
4	EECP73	Capstone Project (Part II)	10
5	EECP81	Industry/Research Lab Internship	16
Total Credits			39

Internship Option:

- Within India/Abroad other aligned with Government of India Schemes
- To enhance hands-on skills (as per NEP-2020)

Alternate Option:

- Alternatively, Courses can also be offered from Open Elective/ Professional Elective.
- Two Course of 3 Credits each and one Major project for 10 Credits

Students may opt for a virtual internship along with courses.

SEMESTER I

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Basic Science	BS101	Physics	3	0	0	3	30	70	100
2	Basic Science	BS102	Mathematics-I	3	1	0	4	30	70	100
3	Engineering Science	ES101	Problem Solving and Programming using C	3	0	0	3	30	70	100
4	Engineering Science	ES102	Mathematical Concepts for AI	3	1	0	4	30	70	100
5	Humanities & Social Science	HS101	Communication Skills	2	0	0	2	30	70	100
6	Humanities & Social Sciences	HS102	Design Thinking	2	0	0	2	30	70	100
Practical										
7	Basic Science	BSP11	Physics Lab	0	0	2	1	30	70	100
8	Engineering Science	ESP12	Problem Solving and Programming using C Lab	0	0	2	1	30	70	100
9	Humanities & Social Science	HSP13	Communication Skills Lab	0	0	2	1	30	70	100
10	Humanities & Social Sciences	HSP14	Design Thinking Lab	0	0	2	1	30	70	100
			Total	16	2	8	22	300	700	1000

SEMESTER II

S. No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Basic Science	BS201	Mathematics-II	3	1	0	4	30	70	100
2	Basic Science	BS202	Chemistry	3	0	0	3	30	70	100
3	Program Core	PC201	Object Oriented Programming using Python	3	0	0	3	30	70	100
4	Program Core	PC202	Data Structures	3	0	0	3	30	70	100
5	Program Core	PC203	Discrete Mathematical Structures	2	0	0	2	30	70	100
6	Program Core	PC204	Computer Organization and Architecture	3	0	0	3	30	70	100
7	Humanities & Social Sciences	HS 201	Universal Human Values: Understanding Harmony and Ethical Human Conduct	1	0	0	1	30	70	100
Practical										
8	Basic Science	BSP21	Chemistry Lab	0	0	2	1	30	70	100
9	Program Core	PCP22	Object Oriented Programming using Python Lab	0	0	2	1	30	70	100
10	Program Core	PCP23	Data Structures Lab	0	0	2	1	30	70	100
			Total	18	1	6	22	300	700	1000

SEMESTER III

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Program Core	PC301	Design and Analysis of Algorithm	3	0	0	3	30	70	100
2	Program Core	PC302	Database Systems	3	0	0	3	30	70	100
3	Program Core	PC303	Computer Networks	3	0	0	3	30	70	100
4	Program Core	PC304	Introduction to Machine Learning	3	0	0	3	30	70	100
5	Program Core	PC305	Artificial Intelligence	2	1	0	3	30	70	100
6	Open Elective	OE301	Open Elective-I	2	0	0	2	30	70	100
Practical										
7	Program Core	PCP31	Design and Analysis of Algorithm Lab	0	0	2	1	30	70	100
8	Program Core	PCP32	Database Systems Lab	0	0	2	1	15	35	100
9	Program Core	PCP33	Computer Networks Lab	0	0	2	1	15	35	100
10	Program Core	PCP34	Machine Learning Lab	0	0	2	1	30	70	100
11	Open Elective	OEP35	Open Elective I Lab	0	0	2	1	30	70	100
			Total	16	1	10	22	300	700	1000

SEMESTER IV

S. No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Program Core	PC401	Theory of Computation	3	1	0	4	30	70	100
2	Program Core	PC402	Software Engineering	3	0	0	3	30	70	100
3	Program Core	PC403	Deep Learning	3	0	0	3	30	70	100
4	Program Core	PC404	Operating System	3	0	0	3	30	70	100
5	Humanities & Social Science	HS401	Theory of Computational Ecosystem	3	0	0	3	30	70	100
6	Audit Course	AU401	Environmental Science	3	0	0	0	30	70	100
Practical										
7	Basic Science	PCP41	Software Engineering Lab	0	0	2	1	30	70	100
8	Engineering Science	PCP42	Deep Learning Lab	0	0	2	1	30	70	100
9	Humanities & Social Science	PCP43	Operating System Lab	0	0	2	1	30	70	100
10	Employment Enhancement Course	EECP44	Minor Project	0	0	6	3	60	140	200
			Total	18	1	12	22	300	700	1000

SEMESTER V

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Program Core	PC501	Data and Visual Analytics in AI	3	0	0	3	30	70	100
2	Program Core	PC502	Natural Language Processing	3	0	0	3	30	70	100
3	Program Core	PC503	Advanced Machine Learning	3	0	0	3	30	70	100
4	Program Core	PC504	Optimization Technique in Machine Learning	3	1	0	4	30	70	100
5	Audit Course	AU501	Indian Constitution	3	0	0	0	30	70	100
Practical										
6	Program Core	PCP51	Data and Visual Analytics in AI Lab	0	0	2	1	30	70	100
7	Program Core	PCP52	Natural Language Processing Lab	0	0	2	1	30	70	100
8	Program Core	PCP53	Advanced Machine Learning Lab	0	0	2	1	30	70	100
9	Employment Enhancement Course	EELP54	Minor Project	0	0	8	4	100	200	300
			Total	15	1	14	20	310	690	1000

SEMESTER VI

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Program Core	PC601	Soft Computing	3	0	0	3	30	70	100
2	Professional Elective	PE601	Professional Elective I	3	0	0	3	30	70	100
3	Professional Elective	PE602	Professional Elective II	3	0	0	3	30	70	100
4	Open Elective	OE601	Open Elective II	3	0	0	3	30	70	100
Practical										
5	Program Core	PCP61	Soft Computing Lab	0	0	2	1	30	70	100
6	Professional Elective	PEP62	Professional Elective I Lab	0	0	2	1	30	70	100
7	Professional Elective	PEP63	Professional Elective II Lab	0	0	2	1	30	70	100
8	Open Elective	OEP64	Open Elective II Lab	0	0	2	1	30	70	100
9	Employment Enhancement Course	EECP65	Capstone Project (Part I)	-	-	-	6	30	70	100
			Total	12	0	8	22	300	700	1000

SEMESTER VII

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Theory										
1	Professional Elective III	PE701	Professional Elective III	3	0	0	3	30	70	100
2	Professional Elective IV	PE702	Professional Elective IV	3	0	0	3	30	70	100
3	Employment Enhancement Course	EEC701	Capstone Project (Part II)	-	-	-	10	30	70	100
Practical										
7	Professional Elective III	PEP71	Professional Elective III Lab	0	0	2	1	30	70	100
8	Professional Elective IV	PEP72	Professional Elective IV Lab	0	0	2	1	30	70	100
			Total	6	0	4	18	280	480	700

SEMESTER VIII

S.No	Course Category	Course Code	Course Title	L	T	P	C	Evaluation Scheme		Subject Total
								Sessional (INT)	External (ESE)	
Practical										
1	Employment Enhancement Course	EECP81	Industry/Research Lab Internship	-	-	-	16	150	350	500
Internship Option						Alternate Option				
<ul style="list-style-type: none"> • Within India or Abroad other aligned with GOI schemes • To enhance hands-on skills (as per NEP-2020) 						<ul style="list-style-type: none"> • Alternatively, Courses can also be offered from Open Elective/ Professional Elective • Two Course of 3 credits each and one Major project for 10 credits <p>Students may opt for a virtual internship along with courses</p>				