



Bachelor of Technology in CSE with Specialization AI & Data Science

B. Tech. -CSE (AI & DS)

(Aligned with NEP 2020 & with the guidelines of UGC/ AICTE)

Academic Batch: 2026–2030

JK Institute of Technology (JKIT)

Programme Overview

About the Programme

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The **Bachelor of Technology in Computer Science and Engineering with Specialization in Artificial Intelligence & Data Science (B.Tech. CSE – AI & DS)** is a four-year undergraduate engineering programme that integrates core Computer Science principles with advanced technologies in **Artificial Intelligence, Machine Learning, Data Science, and Big Data Analytics**. Aligned with **NEP 2020** and **AICTE guidelines**, the programme equips students with the knowledge and skills required to develop intelligent, data-driven solutions for real-world challenges.

The curriculum combines a strong foundation in programming, algorithms, databases, software engineering, cloud computing, and cybersecurity with specialized training in AI, machine learning, predictive analytics, data visualization, and business intelligence. Through hands-on laboratories, projects, internships, hackathons, and industry interactions, students gain practical experience in applying data and intelligent technologies across diverse sectors.

Graduates are prepared for careers in **Data Science, Artificial Intelligence, Machine Learning, Business Analytics, Big Data Engineering, Software Development, and Cloud Technologies**, while also building a strong foundation for higher education, research, and entrepreneurship.

Programme Highlights

→ NEP 2020 Aligned

Flexible, multidisciplinary curriculum integrating Computer Science, Artificial Intelligence, and Data Science.

→ CSE with AI & Data Science Specialization

Comprehensive training in intelligent computing, machine learning, analytics, and data-driven technologies.

→ Industry-Oriented Curriculum

Designed to meet the growing demand for AI and data science professionals across industries.

→ Value Education

Holistic development through courses on ethics, leadership, communication, and professional excellence.

→ Career Readiness

Dedicated training in coding, analytics, aptitude, communication, and placement preparation.

Semester I — Building the Foundations of Computing, Logic, and Intelligent Systems

Total Credits: 28 | The first semester builds a strong foundation in programming, computational thinking, mathematics, electronics, and computer systems while developing the analytical, communication, and problem-solving skills required for Artificial Intelligence, Data Science, and modern computing technologies.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr.
1	CSCC001	Programming Logic & Technique	BRC	2	0	1	3
Commencement of First Semester							
2	CSCC101	Programming with C	MAJ	2	0	1	3
3	CSCC102	Operating System	MAJ	3	0	1	4
4	ELIX101	Digital Logic Design	MAJ	2	0	1	3
5	RISE101	Computational Thinking and Problem-Solving Technique	MIN	3	0	1	4
6	MATH101	Mathematics for Computer Science	MD	3	0	0	3
7	PHYS101/ ELIX102	Modern Physics/ Basic Electronics	MD	2	0	1	3
8	ABLE101	Communicative English - I	AEC	1	0	1	2
9		Elective	SEC	1	0	2	3
10	JKVA101	Science of Mind Management	VAC	1	0	1	2
11	JKGP101	General Proficiency-1	GP	-	-	1	1

Semester II — Developing Programming, AI, and Engineering Foundations

Total Credits: 28 | The second semester develops strong programming, data structures, and AI foundations while enhancing analytical thinking, engineering skills, and innovation capabilities required for advanced studies in Artificial Intelligence and Data Science.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr.
1	CSCC103	Data Structures using C	MAJ	2	0	1	3
2	CACC101	Structured Python Programming	MAJ	2	0	1	3
3	AIML101	Introduction to AI	MAJ	3	0	1	4
4	RISE102	Design Thinking	MIN	3	0	1	4
5	MATH103	Applied Mathematics	MD	3	0	0	3
6	PHYS101/ ELIX102	Modern Physics/ Basic Electronics	MD	2	0	1	3
7	ABLE102	Communicative English - II	AEC	1	0	1	2
8	RISE105	Engineering Graphics & CAD	SEC	1	0	2	3
9	JKVA102	Art & Science of Happiness	VAC	1	0	1	2
10	JKGP102	General Proficiency - II	GP	-	-	1	1

③ BRC- Bridge Course | MAJ – Major | MIN – Minor | MD – Multi Disciplinary | AEC – Ability Enhancement Course | SEC – Skill Enhancement Course | VAL – Value Added Course | GP – General Proficiency

Semester III — Building Data-Centric and Analytical Computing Skills

Total Credits: 23 | The third semester strengthens students' expertise in databases, advanced programming, networking, and data-centric computing while developing the analytical and statistical skills required for Artificial Intelligence, Data Science, and intelligent business applications.

Sl. No.	Code	Subject	Category	L	T	P	Cr.
1	CSCC 201	DBMS	MAJ	2	0	1	3
2	CSCC 205	Computer Hardware & Networking	MAJ	3	0	1	4
3	CACC201	Advanced Python Programming	MAJ	2	0	1	3
4	AIML211	Data Centric	MIN	3	0	1	4
5	MATH 201	Probability & Statistics	MD	3	0	0	3
6	DTSC201	Analytics for Industries	SEC	1	0	2	3
7	JKVA201	Golden Rules for Living Your Best Life	VAC	2	0	0	2
8	JKGP201	General Proficiency 3	GP	-	-	1	1

Semester IV — Exploring Data Science and Intelligent Analytics

Total Credits: 21 | The fourth semester develops expertise in data science, exploratory analytics, machine learning, and backend application development while equipping students with the skills required to transform data into intelligent business and technological solutions.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr.
1	CSCC202	Programming in Java	MAJ	2	0	1	3
2	CSCC203	Computer Organization and Architecture	MAJ	3	0	1	4
3	DTSC202	Data Science & Exploratory Analytics	MAJ	3	0	1	4
4	AIML212	Machine Learning	MIN	3	0	1	4
5	CACC204	Backend Development for Data Applications	SEC	1	0	2	3
6	JKVA202	The Power of Thoughts	VAC	1	0	1	2
7	JKGP202	General Proficiency 4	GP	-	-	-	1

- ✔ Semester IV marks the completion of the first two years — students are now eligible for a **Diploma exit** under the NEP 2020 multiple entry/exit framework.

Semester V — Advancing Generative AI, Analytics, and Intelligent Decision-Making

Total Credits: 21 | The fifth semester develops expertise in Generative AI, analytics, intelligent agents, and AI-enabled web technologies while equipping students with the skills required to build innovative, data-driven, and intelligent solutions for modern industries.

Sl. No.	Code	Subject	Category	L	T	P	Cr.
1	CSCC 301	Design Algorithm & Analysis (DAA)	MAJ	3	0	1	4
2	CACC 301	Internet Web Technology & AI Applications	MAJ	2	0	1	3
3	DTSC303	Descriptive Analytics	MAJ	3	0	1	4
4	AIML305	Introduction to Gen AI and Prompt Engineering	MIN	3	0	1	4
5	AIML306	Reinforcement Learning & Intelligent Agents	SEC	1	0	2	3
6	RISE303	Employability Planning I	AEC	1	0	1	2
7	JKGP301	General Proficiency 5	GP	-	-	-	1

Semester VI — Mastering Deep Learning, NLP, and Autonomous AI Systems

Total Credits: 23 | The sixth semester develops advanced expertise in Deep Learning, Natural Language Processing, Cloud AI, and Agentic AI while preparing students to build scalable, intelligent, and autonomous systems for next-generation digital enterprises.

Sl. No.	Course Code	Subject	Category	L	T	P	Cr.
1	CSCC302	Software Engineering	MAJ	3	0	1	4
2	AIML301	Deep Learning	MAJ	3	0	1	4
3	CDLC307	Cloud Computing for AI Systems	MAJ	3	0	1	4
4	AIML302	Natural Language Processing	MIN	3	0	1	4
5	AIML308	Agentic AI	SEC	1	0	2	3
6	RISE302	Employability Planning II	AEC	1	0	1	2
7		Minor Project	Minor Project	0	0	2	2
8	JKGP302	General Proficiency 6	GP	-	-	-	1

Semesters VII & VIII — Research, Industry Immersion, and Responsible AI

For Honours Students:

CSCC401 – High Performance Computing (HPC) | Honours Degree | 4 Credits

DTSC401 – Big Data Analytics | Honours Degree | 4 Credits

AIML402 – Computer Vision | Honours Degree | 4 Credits

For Non-Honours Students:

Elective I | MAJ | 4 Credits

Elective II (Skill / Open Basket) | MAJ | 4 Credits

Elective III (Skill / Open Basket) | MAJ | 4 Credits

AIML403 – MLOps & Model Deployment | MIN | 4 Credits

CYBR401 – Data Security & Privacy for AI Systems | SEC | 3 Credits

Total Credits: 19

Semester VIII — Total Credits: 22

Project

Research Project / Live Industry Project / Capstone Project with Seminar Presentation | Research Track / Industrial Track | **12 Credits**

AIML405 – Responsible & Explainable AI | MIN | 4 Credits

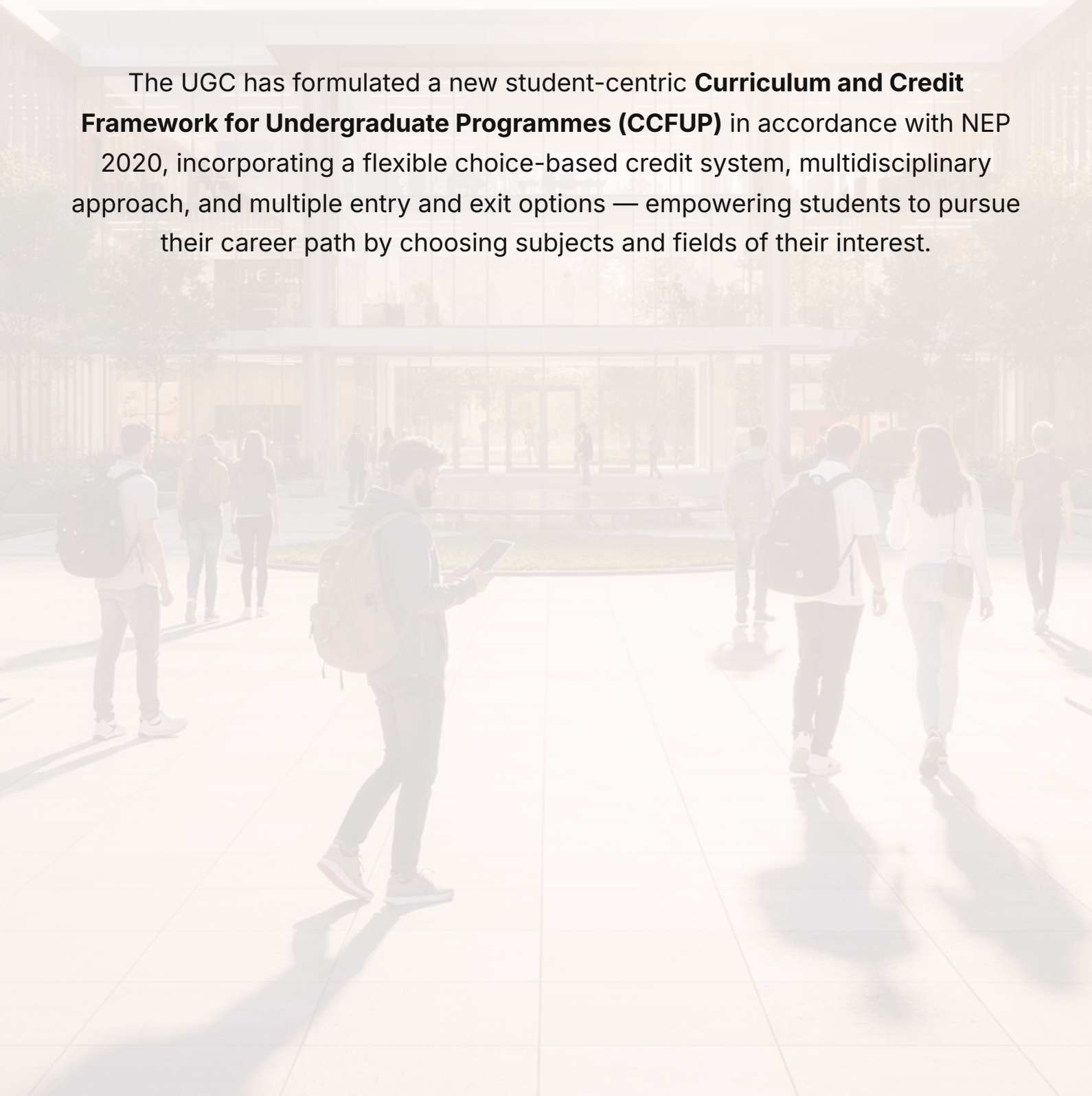
On-the-Job Training (OJT) / Internship | SEC | 6 Credits

- ✓ The final semester is dedicated to **research, innovation, and professional practice**, enabling students to apply Artificial Intelligence and Machine Learning concepts to real-world challenges. Students undertake a **Research Project, Live Industry Project, or Capstone Project**, demonstrating their ability to design, develop, deploy, and evaluate intelligent solutions while showcasing their technical, analytical, and problem-solving capabilities through a seminar presentation. This semester prepares graduates for professional careers, higher studies, entrepreneurship, and research in emerging AI technologies.

Features of National Education Policy (NEP-2020)

For UG Programs

The UGC has formulated a new student-centric **Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)** in accordance with NEP 2020, incorporating a flexible choice-based credit system, multidisciplinary approach, and multiple entry and exit options — empowering students to pursue their career path by choosing subjects and fields of their interest.



Core Features of the NEP Framework

The NEP 2020 framework introduces transformative changes to undergraduate education, designed to give students greater freedom, flexibility, and holistic development.

Flexible Curricular Structures

Creative combinations of disciplinary areas enabling multidisciplinary study alongside rigorous specialisation in chosen subjects.

Multiple Entry & Exit Options

3 or 4-year UG degree programmes with UG Certificate, UG Diploma, or Degree depending on credits secured.

4-Year Honours Degree

Eight-semester programme with an option for Honours with Research upon completion of a rigorous research project in the major area.

Holistic & Multidisciplinary Education

The 4-year programme is the preferred option, offering the full range of holistic education alongside chosen major and minor disciplines.

Global Citizenship Education

Education for sustainable development integrated into the curriculum to empower learners as active promoters of peaceful, inclusive, and sustainable societies.

Internships & Apprenticeships

Opportunities with industries, businesses, premier institutions, and research organisations to actively engage with the practical side of learning.

Cutting-Edge Curriculum

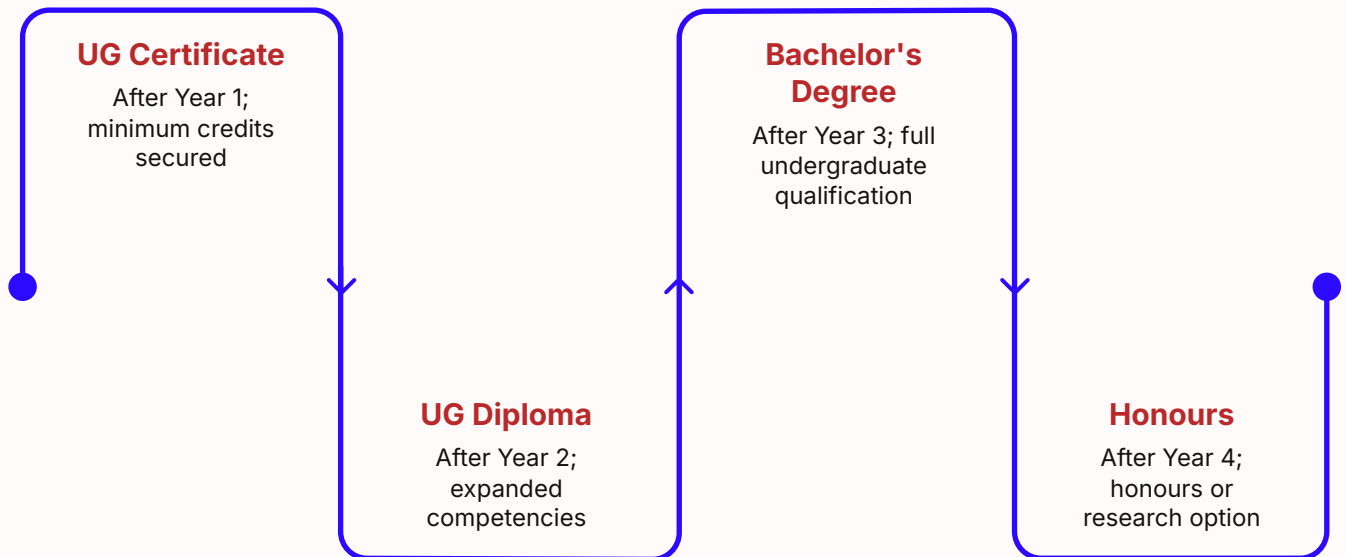
Preparation in AI, Agentic AI, Big Data, Machine Learning, FinTech, Cyber Security, Quantum Computing, Robotics, VLSI, Genomics, and more.

Alternative Learning Modes

Flexibility to switch between offline, ODL, online, and hybrid modes of learning as per student needs.

Multiple Entry & Exit Options

One of the most student-friendly features of NEP 2020 is the structured pathway that allows students to enter, exit, and re-enter the UG programme at defined milestones — ensuring no year of study is wasted.



Students who exit with a UG Certificate or UG Diploma are permitted to **re-enter within three years** and complete the degree programme. Students may also take a break during the period of study, but the total duration for completing the programme shall not exceed **7 years**.

- ⓘ The Academic Bank of Credit (ABC) and guidelines for Multiple Entry and Exit are already in place to facilitate the implementation of CCFUP.

Minimum Credit Requirements

A student must fulfil the following minimum credit requirements for the award of a degree under each category. The framework ensures a balanced distribution across major, minor, multidisciplinary, and skill-based components.

Category	3-Year UG (120 Credits)	4-Year UG (160 Credits)	Remarks
Major with Specialisation	Min. 60 Credits (50%)	Min. 80 Credits (50%)	Core discipline focus
Minor Discipline	Min. 32 Credits	Min. 32 Credits	Broader understanding
Multidisciplinary Courses	Min. 9 Credits	Min. 9 Credits	Liberal arts & science
Ability Enhancement (AEC)	Min. 8 Credits	Min. 8 Credits	Language & communication
Skill Enhancement (SEC)	Min. 9 Credits	Min. 9 Credits	Practical & soft skills
Value-Added Courses (VAC)	Min. 6 Credits	Min. 6 Credits	Understanding India, community
Summer Internship	Min. 2–4 Credits	Min. 4 Credits	Work-based learning
Research Project / Dissertation	—	Min. 12 Credits	Honours with Research only
Total Minimum Credits	120 Credits	160 Credits	20 credits per semester

- ❑ 40% of the credits in any category may be earned through online courses approved by the Department and Institution as per existing UGC regulations.

Course Level Numbering System

The NEP framework introduces a standardised course numbering system to indicate the level and complexity of each course offered across all UG and PG programmes.

1	0–99: Pre-requisite / Bridge Courses Pass or fail courses with no credits. Replaces the existing informal bridge courses conducted in colleges and universities.
2	100–199: Foundation / Introductory Courses Entry-level courses designed to introduce students to the fundamentals of a discipline.
3	200–299: Intermediate-Level Courses Courses that build upon foundational knowledge and develop deeper understanding.
4	300–399: Higher-Level Courses Advanced undergraduate courses requiring prior foundational and intermediate knowledge.
5	400–499: Advanced Courses Specialised courses at the upper undergraduate level, often linked to research and industry applications.
6	500–699: Master's Level Courses 500–599 for first-year Master's; 600–699 for second-year of 2-year Master's or 1-year Master's degree programmes.
7	700+: Doctoral Level Courses Courses limited to doctoral students pursuing advanced research and specialisation.

Major, Minor & Multidisciplinary Disciplines

Major Discipline (Min. 80 Credits)

The primary discipline of focus. Students must secure ~50% of total credits through core courses in the major with specialisation. A student with 80 credits in Physics out of 160 total credits is awarded B.Sc. (Hons.) in Physics.

Eligibility for Honours with Research: CGPA of 7.5 (75%) after completion of 3rd year (6th semester).

Students can opt for a **Double Major** by securing a minimum of 40% credits (64 out of 160) from a second major discipline.

Minor Discipline (Min. 32 Credits)

Helps students gain broader understanding beyond the major. For example, a student in Computer Science & Engineering (AI&ML) may choose Cyber Security or Data Engineering as a minor.

Minor stream courses must be from the 300-level or above. 50% of minor credits must be in the relevant subject; the remaining 50% can be from any discipline of the student's choice.

Multidisciplinary Courses (Min. 9 Credits)

All UG students must complete 3 introductory-level courses from broad disciplines such as Natural Sciences, Mathematics & Statistics, or Humanities. Students cannot repeat courses already studied at the 12th class level.

- ① Students may change their major within the broad discipline at the end of the first year. HEIs may create **10% additional seats** over and above sanctioned strength to accommodate change-of-major requests, with preference given to students with the highest CGPA and no arrears.

Ability Enhancement, Skill Enhancement & Value-Added Courses

These course categories ensure that every UG student develops well-rounded competencies — from language and communication to practical skills and civic awareness.



Ability Enhancement Courses (AEC) — Min. 8 Credits

Focused on **Modern Indian Language (MIL) & English** with emphasis on language and communication skills. Develops critical reading, expository writing, academic writing, and the ability to participate in discussions and debates. Helps students appreciate the cultural and intellectual heritage of their chosen MIL.



Skill Enhancement Courses (SEC) — Min. 9 Credits

Aimed at imparting **practical skills, hands-on training, and soft skills** to enhance employability. Institutions may design courses as per students' needs and available resources. Vocational Education and Training forms an integral part, with a minimum of 12 credits allotted to the Minor stream for vocational courses.



Value-Added Courses (VAC) — Min. 6–8 Credits

Understanding India: Knowledge of contemporary India, its historical perspective, national development goals, constitutional values, fundamental rights and duties, India's freedom struggle, and Indian knowledge systems.
Community Engagement & Service: Exposes students to socio-economic issues and supplements theoretical learning with real-life experiences. **Field-Based Learning / Minor Project:** Provides exposure to development-related issues in rural and urban settings.

Internships, Projects & Research

Summer Internship / Apprenticeship / OJT (Min. 2–4 Credits)

All students undergo internships or apprenticeships in firms, industries, organisations, or research labs during the summer term. Opportunities span local industry, business organisations, health sectors, local governments (panchayats, municipalities), Parliament, media organisations, artists, and crafts persons. Students exiting after the first two semesters must complete a **4-credit work-based learning/internship** to receive a UG Certificate.

Minor Project (Min. 2 Credits)

A practical, hands-on project applying concepts from programming, data analytics, or AI. Students design and develop a small software application, AI model, or data-driven solution to solve a real-world problem. May be carried out individually or in a small team under faculty supervision. Requires a project report and presentation/demonstration at the end of the semester. Objective: enhance problem-solving ability, coding skills, and technical confidence before the major project.

Major / Captioned Project (Min. 12 Credits)

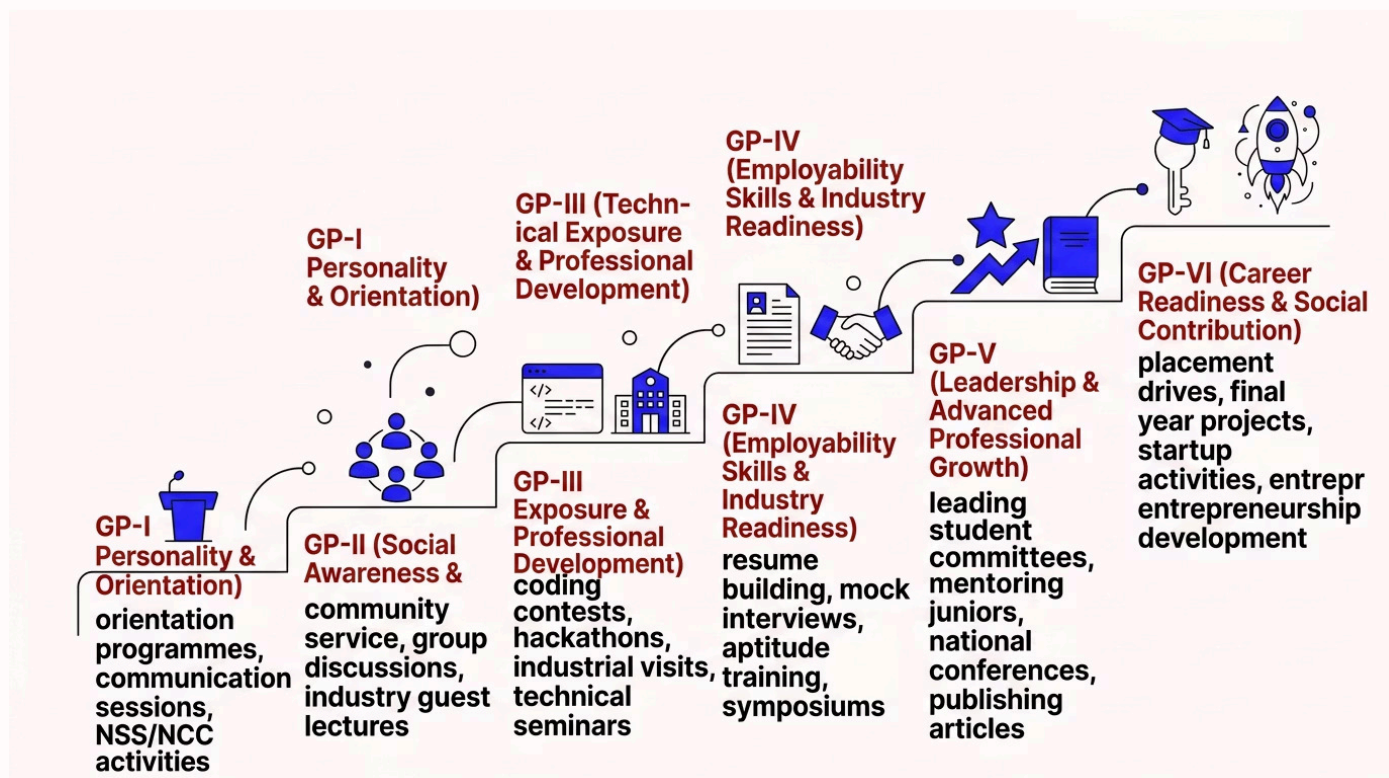
Applies knowledge and skills acquired throughout the programme to address a significant real-world problem. Develops research aptitude, critical thinking, innovation, and professional competencies. Involves problem identification, literature review, methodology development, analysis, implementation, testing, and documentation. May be carried out in collaboration with industry, research organisations, government agencies, or community stakeholders. Culminates in a project report, presentation, demonstration, and viva-voce — serving as a capstone experience reflecting NEP 2020 graduate attributes.

Research Project / Dissertation (Min. 12 Credits — Honours with Research)

Students choosing a 4-Year Bachelor's degree (Honours with Research) must take up a research project under faculty guidance, to be completed in the **eighth semester**. Research outcomes may be published in peer-reviewed journals, presented at conferences/seminars, or patented. Eligibility: CGPA \geq 7.5 after the 6th semester. Honours students not undertaking research will complete 3 courses for 12 credits in lieu of the dissertation.

General Proficiency — Semester-wise Development

General Proficiency is a co-curricular component that tracks the holistic development of students across all six semesters, from orientation and personality building to career readiness and community contribution.



Stage	Focus Area	Key Objective
GP-I	Personality & Orientation	Build confidence and communication skills at entry level
GP-II	Social Awareness	Improve teamwork, social responsibility, and leadership basics
GP-III	Technical Exposure	Enhance technical confidence and presentation skills
GP-IV	Employability Skills	Develop employability skills and professional grooming
GP-V	Leadership & Mentorship	Develop leadership, mentoring ability, and professional maturity
GP-VI	Career Readiness	Ensure career readiness, ethical responsibility, and community contribution

Modular Teaching & Evaluation Pattern

The NEP 2020 framework introduces a modular, continuous evaluation system that balances internal assessments, practical work, and end-term examinations to provide a comprehensive and fair assessment of student learning.

Internal Assessment Breakdown (60 Marks)

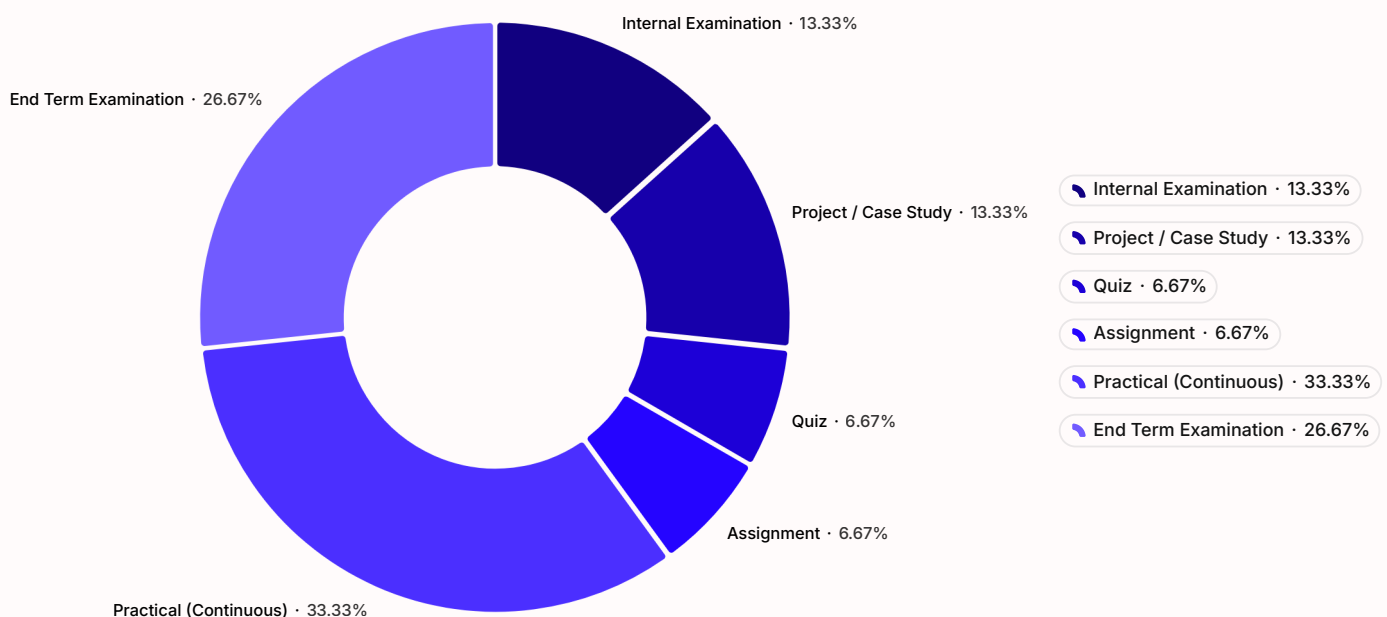
Component	Marks
One Internal Examination	20 Marks
Project / Case Study (2 × 10 Marks)	20 Marks
Quiz (1 Number)	10 Marks
Assignment (1 Number)	10 Marks
Total Internal	60 Marks

External Assessment

Component	Marks
Practical (Continuous Evaluation)	50 Marks
Final Examination (End Term)	40 Marks

Key Highlights of the Evaluation System

- Continuous and comprehensive assessment throughout the semester
- Project and case study-based evaluation promotes applied learning
- Quizzes and assignments ensure regular engagement with course content
- Practical evaluation rewards hands-on skills and lab performance
- End-term examination tests conceptual depth and analytical ability
- VIII Semester core major may be seminar-based with student presentations and discussions



The modular evaluation pattern ensures that students are assessed continuously and holistically, reducing dependence on a single high-stakes examination and encouraging consistent academic engagement throughout the programme.