NAVRACHANA UNIVERSITY
a UGC recognized University

B.Tech-Computer Science and Engineering (2021-25)

PROGRAM AND CREDIT STRUCTURE

Vision

Globally known for its center of excellence in Computer Science and Engineering by developing professionals who are adaptive to latest technologies and technological evolutions that will create significant different in the lives of humans, society and industry with ethics.

Mission

- To collaborate with reputed educational institutes, research labs and technology leaders around the world to strengthen the education and research ecosystem provide up to the mark knowledge to the students.
- To create industry ready professionals who can work as a team member and lead the team to provide real-time solutions for the societal problems.
- To contribute towards overall development of the students and make them lifelong learners through innovative teaching learning practices.
- To foster quality research for solving societal, environmental and technological issues by providing conducive environment.

Program Objectives

Businesses rely increasingly on Computer Science and Informatics, and the speed with which computing technology continues to transform our daily lives is truly astonishing. Specialists in this subject area are in demand all over the world because their applied skills can revolutionize businesses and organizations of all kinds.

The fast changing technological scenario poses to the Institute a challenge of continuously updating its curriculum and faculty to be able to provide state-of-the-art education to the students. Changes, both major and subtle, have been made by the department of Computer Science and Engineering (CSE), to be better prepared for tomorrow.

The B. Tech program in Computer Science and Engineering was started in the year 2006 with an intake of 60. Besides, an additional 20% seats are under lateral entry scheme.

The department is also offering M. Tech in Computer Science and Engineering specialization in Internet of Things from year 2019 with an intake of 6.

In the Year 2020 onwards the Department is offering a program B. Tech (CSE) minor specialization in Artificial Intelligence and Machine learning.

Program Description

This program produces graduates with a broad understanding of both computing principles and computing practice. The program emphasizes the fundamental computing models through the design and analysis of algorithms and software. Included in the program is coursework in a computing application area outside of the School of Engineering and Technology such as Entrepreneurship, Environmental Studies and Social interactions through Khoj. The program is supported by study in Mathematics, Basic Science, and engineering. Students gain hands-on experience in the laboratory courses accompanying classroom work, and develop design skills in course work using project based learning, Projects and internships. Design experience continues in the areas of Computer engineering and in emerging areas of the student's choosing, culminating in the Designing the capstone Projects. The Students of Computer Science Engineering are also having the opportunity of learning the minor specialization in the emerging field like Artificial Intelligence and Machine learning. The Industry expert and the academic expert of the reputed organization supported us in defining the Curriculum and syllabus designing. The Department will always wish to benchmarked itself with the IITs, NITs and reputed institutions across the country and also globally.

Program Educational Objectives (PEO)

A graduate of the Computer Science and Engineering Program should:

PEO-I

Students will establish themselves as effective professionals by solving real problems through the use of computer science knowledge and with attention to team work, effective communication, critical thinking and problem solving skills.

PEO - II

Students will develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of computer science and related fields.

PEO - III

Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

PEO - IV

Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

Program Outcome

A graduate of the Computer Science and Engineering program will demonstrate:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and engineering specialization to solution of complex engineering programs.
2. **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/development of Solutions:** Design solutions for complex engineering problems and design system components or process that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage independent and life-long learning in the broadest context of technological change.

Choice Based Credit System

The Indian Higher Education Institutions have been moving from the conventional annual system to semester system. Currently many of the institutions have already introduced the choice based credit system, the semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than, the required credits, and adopt an interdisciplinary approach to learning, it is desirable that the HEIs move to CBCS and implement the grading system, The Department of Computer Science Engineering is offering a minor specialization in Artificial Intelligence and Machine learning under the Choice based credit system which a student have to came 12 credit additions to their regular recommended credit of 168 and this option is completely shared with the students. For the regular students of CSE, the choice based credit system is will give the option of choosing their elective course from the recommended elective basket and also offering 2 Interdisciplinary course which will provide the option to learn a course away the School of Engineering and Technology.

Type of Courses

General Courses: General education is an important aspect of our education. We place strong emphasis on Critical Thinking and Technical Reading and Writing, communication, Environmental science and Soft skills as part of the General Education at the university.

Foundational Courses: Engineering is the applied knowledge of scientific principles to analyse, design and develop a new device or machines. It is important to connect science and engineering curriculum. B. Tech curriculum integrates engineering with basic science courses for the preparedness of student's foundation and for improving student's understanding about engineering and technology. We place strong emphasis on physics, chemistry, Mathematics.

Project based Courses: While early education in B. Tech is theory-focused and academic; in the later years the education is hands-on project based and students apply what gets taught in the classrooms. Upper level students i.e. third and final year students undertake design projects to learn constructing working prototypes that solve problems confronting the society. We have also introduced experiential engineering in two semesters which are purely on hands on work on daily practical problems and issues.

Core Courses: A wide range of core courses in Computer Science & engineering including courses on Problem Solving skills using the programming language C and python, Data Structure, Design and Analysis of Algorithms, Digital logic and Computer organization, Computer Network, Database Management system, Software Engineering, Operating System, Discrete Mathematics, Theory of Computations also including the advance courses like Artificial Intelligence, Data Analytics, Machine Learning, Fundamental of IOT.

Cross-disciplinary Courses: Cross-disciplinary education is another hallmark of our B. Tech education. Students from one discipline have a choice to take courses from another engineering discipline. For example, Computer Science & Engineering students choose a range of courses from Mechanical, Civil, and Electrical Engineering programs. This helps to expand disciplinary boundaries, explore opportunities to fuse information.

Interdisciplinary Courses: To provide comprehensive and broad-based education we offer interdisciplinary spanning over two semesters and students can choose courses from a basket of electives in management, education, design offered by programs across the university. This helps in the making T-shaped students who have a broad education through cross and interdisciplinary education and a focused expertise through disciplinary education.

Entrepreneurship Courses: All students receive Entrepreneurship education at NUV as we believe in producing "job creators" in addition to "job seekers", Consequently they take at least on course during their education at the university, Students can sign up for additional Entrepreneurship through Independent study and with faculty to receive education. This Helps students become and also prepare for employment as employers seek out students with entrepreneurial skills.

Curriculum and Course Assessment:

Every program has a prescribed course structure which in general terms is known as the prescribes all the courses, laboratory sessions, and other requirements for the program and semester-wise sequence of the courses. It also provides the syllabus for each course. The course is one constituent of the curriculum of a program traditionally termed as "Subject" or "Paper". Each course University has a specific Code. The curriculum and the syllabi are duly approved by the Academic hours per credit for lectures, tutorials, and practical. One credit equals to 15 hours of contact lectures, tutorials) and 30 hours of contact for practical. Academic programs are allowed to school Academic Council of the University.

Course Credit Structure

Courses are assigned credits on the basis of the standard LTPC credit Structure. The credits for a course obtained from the number of contact distribute contact hours through the semester.

For weekly scheduling of classes each hour of lecture or tutorial is counted as one credit and each hour of practical is counted as half credit.

Course Conduct and Assessment

Conduct

For every program, before the beginning of an academic semester, a timetable covering all the courses to taught in the semester is prepared by the program coordinator in consultation with the concerned faculty members and considering the availability of infrastructure facilities as required. The timetable would be in line with the academic calendar and provide adequate number of sessions for all courses as required. The timetable is communicated to all concerned, including the faculty, students and the academic offices It is expected that the timetable would be adhered to diligently. The Program coordinator may change the time table in order to meet contingencies with prior consent of the concerned faculty members.

Attendance

a) The University expects 100% attendance, but a minimum 80% attendance is mandatory in each course eligible to appear for the end-semester examination of the course.

b) Additional 15% absence is allowed for representing the university at any regional, national or international competition in the field of academics or sports or due to long duration ill-health or other emergency situations, provided these activities/circumstances could not be accommodated within the 20% acceptable absence. Documentary evidence is required to receive excusable absence.

c) Over the time, the permissible attendance will be increased to 85%.

d) A student not meeting the attendance requirements in a course will not be allowed to appear for the regular end semester examination and will be awarded 'F' grade in that course. However, she/he may be permitted for re-examination as per the conditions applicable.

e) A student with very low attendance i.e. less than 60% In all courses during the current semester will not be allowed to appear for regular end semester examination. She/he will have to re-register all courses during the next academic year.

Course Assessment

The University follows a continuous evaluation system consisting of internal for the marks of 60 and external assessment components for the marks of 40. Modes of Internal Assessment Include home assignments, tutorial assignments, laboratory work, group assignments, quizzes, mid semester tests/examinations (open or closed book), viva-voce, live projects, etc.

The end-semester examination or any exhaustive project Involving external assessors is treated as a component of external assessment.

The distribution of weight age between Internal and external assessment for different academic programs is at the discretion of the school. However, the University recommends the distribution in proportion 60:40 (60% for internal components and 40% for end semester exam or a similar component). A student is required to obtain a minimum 40% in each component and 40% overall.

Each course in charge is expected to inform students the weight-age of different components of continuous evaluation in course syllabus and prepare them accordingly through the semester. Course In charge is also expected to regularly inform them (students) about their performance in each internal component.

Examination

A student is eligible to appear for the end semester exam of a course if she/he has registered for the course and meets the specified attendance requirements.

Course Structure:

L = Lecture	T = Tutorial	P = Practical	C = Credit
number of hours/week	number of hours/week	number of hours /week	Total Credits

Semester - I					
Sr. No.	Course Name	Credit Structure			
		L	T	P	C
1	Linear Algebra and Calculus	3	0	0	3
2	Basic Electrical and Electronics	3	0	0	3
3	Basic Electrical and Electronics Laboratory	0	0	2	1
4	Introduction to Web Design	2	0	0	2
5	Introduction to Web Design Laboratory	0	0	2	1
6	Introduction to Computer Programming	3	0	0	3
7	Introduction to Computer Programming Laboratory	0	0	4	2
8	Engineering Physics	2	0	0	2
9	Engineering Physics Laboratory	0	0	2	1
10	Workshop Practices	0	0	3	1.5
	Total				**19.5**

Semester - II					
Sr. No.	Course Name	Credit Structure			
		L	T	P	C
1	Problem solving using Python	2	0	0	2
2	Problem solving using Python Laboratory	0	0	4	2
3	Engineering Chemistry	2	0	0	2
4	Engineering Chemistry Laboratory	0	0	2	1
5	Digital Logic Design	3	0	0	3
6	Engineering Mathematics - II	3	0	0	3
7	Communication Skills	0	0	2	1
8	Applied Mechanics	2	0	0	2
9	Applied Mechanics Laboratory	0	0	2	1
10	Engineering Graphics	2	0	0	2
11	Engineering Graphics Laboratory	0	0	3	1.5
	Total				**20.5**

Semester - III					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Web Technology	3	0	0	3
2	Web Technology Laboratory	0	0	2	1
3	Object Oriented Programming	3	0	0	3
4	Object Oriented Programming Laboratory	0	0	2	1
5	ID -I	2	0	0	2
6	Introduction to Microprocessor	3	0	0	3
7	Environmental Studies	4	0	0	4
8	Discrete Mathematics	3	0	0	3
9	Data Structures	3	0	0	3
10	Data Structures Laboratory	0	0	2	1
	Total				**24**

Semester - IV					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Software Engineering	3	0	0	3
2	Database Management System	3	0	0	3
3	Database Management System Laboratory	0	0	2	1
4	ID-II	2	0	0	2
5	Computer Organization and Architecture	3	0	0	3
6	Design analysis and algorithm	3	0	0	3
7	Design analysis and algorithm Laboratory	0	0	2	1
8	Information Security	2	0	0	2
9	Theory of Computation	3	0	0	3
10	Humanities and Social Sciences	2	0	0	2
11	Critical thinking/Technical Reading	0	0	2	1
	Total				**24**

Semester - V					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Computer Networks	3	0	0	3
2	Computer Networks Laboratory	0	0	2	1
3	Mobile Application Development	3	0	0	3
4	Mobile Application Development Laboratory	0	0	2	1
5	Data Warehousing and Data Mining	3	0	0	3
6	Computer graphics	3	0	0	3
7	Computer graphics Laboratory	0	0	2	1
8	Operating Systems	3	0	0	3
9	Operating Systems Laboratory	0	0	2	1
10	Minor Project - I	1	0	2	2
	Total				**21**

Semester - VI					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Big data analytics and Data Visualization	3	0	0	3
2	Big data analytics and Data Visualization Laboratory	0	0	2	1
3	Elective Theory - 1	2	0	0	2
4	Elective Lab - 1	0	0	2	1
5	KHOJ	3	0	0	3
6	Data Science and Machine Learning	3	0	0	3
7	Data Science and Machine Learning Laboratory	0	0	2	1
8	Soft Skills	0	0	2	1
9	Artificial Intelligence	3	0	0	3
10	Artificial Intelligence Laboratory	0	0	2	1
11	Minor Project - II	1	0	2	2
	Total				**21**

Semester - VII					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Elective Theory - 3	2	0	0	2
2	Elective Lab - 3	0	0	2	1
3	Elective - 4	3	0	0	3
4	Entrepreneurship	3	0	0	3
5	Cloud Computing	3	0	0	3
6	Major Project	1	0	4	3
7	Research Methodology	2	0	0	2
8	Cyber Security	2	0	0	2
9	Compiler Design	2	0	0	2
10	Compiler Design Laboratory	0	0	2	1
	Total				**22**

Semester - VIII					
Sr. No.	**Course Name**	**Credit Structure**			
		L	**T**	**P**	**C**
1	Industry Internship	0	0	28	14
	Total				14