

**Faculty of Science and
Technology Savitribai Phule
Pune University Maharashtra,
India**



<http://unipune.ac.in>

**Proposed Structure for
Bachelor of Engineering
in
COMPUTER SCIENCE AND DESIGN
(2021 Course)
(with effect from A.Y. 2021-22)**

Preamble

The field of computing is rapidly changing, especially, since the last decade with continuous emergence of new disruptive technologies such as animation, gaming, virtual reality, augmented reality in addition to artificial intelligence, data science, cyber security, Internet of things, robotics and so on.

21st Century has witnessed rapid technological developments in every sector including the field of Computing. Moreover, it has created new job roles and massive job opportunities for budding engineers.

Premium Institutes such as IITs, NITs, IIITs, public and private Universities, autonomous and affiliated colleges in India have always played a crucial role in producing human resources with required skill sets by capturing and monitoring these developments and by designing and offering various Bachelors degree programmes in engineering.

Savitribai Phule Pune University, Pune has made its significant contribution by offering degree programmes as per the trends from time to time. In the year 1983, it started offering a degree programme in Computer Engineering and the Bachelor of Computer Science (BCS) course, now called B. Sc. (Computer Science) was introduced in the year 1989-90 and was its unique offering in the state of Maharashtra.

The degree programs offered by various Universities in the computing domain have undergone fusion and fission. Thus starting from Electrical Engineering, we have witnessed emergence of degree programs such as Electronics Engineering, Computer Engineering and Information Technology. Universities across nation today are not only offering basic degrees in Computing such as Computer Engineering/Computer Science & Engineering/Computer Technology, Information technology etc but have also recently started offering engineering degree programs in specialized emerging areas such as Artificial intelligence, Data Science, Machine Learning, IoT, Cyber security etc. to provide specialized skills in these emerging areas to cater the tremendous demands by the IT industries in India and abroad. In the years to follow, additional degree programs will be offered in the areas of Cyber Physical systems, Quantum Computing etc.

Computer gaming, graphics and animation, 3D modeling, augmented reality, virtual reality are some of the disruptive technologies that are currently in high demand, but need specialized skill sets. Moreover, industry not only expects the engineering graduates from computing domain to possess traditional skills such as programming and software designs but also the specialized skills from the domains mentioned above. Along with traditional job roles such as programmer, Software Engineer, System Analyst, Software tester etc, new job roles are now been created in these specialized areas such as AR-VR content writer/developer, AR-VR user experience designer, Animator, Audio Engineer, UI and UX designers, 3D Modeler, Graphics designer, Game designer, Professional Gamer, community manager, product manager to name a few. The All India Council for Technical Education (AICTE), New Delhi in its process handbook for the AY 2021-22 has included the course on Computer Science and Design.

The Board of Studies in Computer Engineering discussed at length such emerging trends and skill set requirements of the domains mentioned above and thereby recommends the University authorities to instantiate a new four years Bachelors

Degree in Computer Science and design under the faculty of Science and Technology as a response to cater the needs of industries that are looking for computer professionals with basic computing skills as well as skills from the specialized domains mentioned above.

The Board of Studies in Computer Engineering has prepared a structure for this programme with following features

- The structure is in line with the existing structure for all bachelors programmes offered under the faculty of Science and Technology with respect to teaching scheme, examination scheme, credits and types of courses (Credit, audit, seminars, projects, Internships, Project Based Learning etc)
- The structure and various courses offered for the two semesters of the First year will be the same as offered for all other bachelor programmes
- Core courses in Computing (Data Structures, Discrete Structures, Logic Design, Databases, Operating Systems, Networks, Theory of Computation, Software Engineering) shall be offered in second, third and final year of the programme. These courses shall inculcate basic computing skills. Core courses on Artificial Intelligence and data science provides adequate base for the learner in these disruptive technologies and their application in AR-VR, Animation and Gaming etc.
- Specialized core courses such as Design Thinking, Human Computer Interface, Digital and media marketing, Web Application development etc shall be offered in second, third and final year of the programme.
- Specialized elective courses such as Animation Design and Principles, Multimedia, Computer Game design, Computer Vision, Graphics Design, Usability Engineering, Augmented reality, virtual reality, 3D interaction design etc shall be offered in two separate tracks with six courses in each of the tracks.
- The specialized core and elective courses would be useful to inculcate skill sets in emerging areas of AR-VR, Gaming, Animation, Multimedia, Graphics etc

Savitribai Phule Pune University															
Second Year of Computer Science and Design(2021 Course)															
(With effect from Academic Year 2022-23)															
Semester-III															
Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme				
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral	Total	Lecture	PR/OR	Tutorial	Total	
	Discrete Mathematics	03	-	-	30	70	-	-	-	100	03	--	-	03	
	Data Structures & Algorithms	03	-	-	30	70	-	-	-	100	03	--	-	03	
	Object Oriented Programming	03	-	-	30	70	-	-	-	100	03	--	-	03	
	Logic Design and Computer Architecture	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Computer Graphics	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Data Structures Laboratory	-	04	-	-	-	25	25	-	50	-	02	-	02	
	OOP & Computer Graphics Lab	-	04	-	-	-	25	25	-	50	-	02	-	02	
	Logic Design and Computer Architecture Laboratory	-	02	-	-	-	25	25	-	50	-	01	-	01	
	Humanities & Social Sciences	-	-	01	-	-	25	-	-	25	-	-	01	01	
	Soft Skills	-	02	-	-	-	25	-	-	25	-	01	-	01	
	Audit Course 3														
Total Credit											15	06	01	22	
Total		15	10	01	150	350	125	75	-	700	-	-	-	-	
Semester-IV															
Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme				
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term	Practical	Oral	Total	Lecture	PR/OR	Tutorial	Total	
	Applied Mathematics	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Database Systems Design	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Operating System Design	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Computer Networks	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Design Thinking	03	-	-	30	70	-	-	-	100	03	-	-	03	
	Database System Design Laboratory	-	04	-	-	-	25	25	-	50	-	02	-	02	
	Software Laboratory	-	04	-	-	-	50	-	25	75	-	02	-	02	
	Project Based Learning II	-	04	-	-	-	50	-	-	50	-	02	-	02	
	Code of Conduct	-	-	01	-	-	25	-	-	25	-	-	01	01	
	Audit Course 4														
Total Credit											15	06	01	22	
Total		15	12	01	150	350	150	25	25	700	-	-	-	-	

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Third Year of Computer Science and Design (2021 Course)														
(With effect from Academic Year 2023-24)														
Semester-V														
Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral	Total	Lecture	PR/OR	Tutorial	Total
	Software Engineering	03	-	-	30	70	-	-	-	100	03	--	-	03
	Theory of Computation	03	-	-	30	70	-	-	-	100	03	--	-	03
	Human Computer Interface	03	-	-	30	70	-	-	-	100	03	-	-	03
	Web Application Design	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – I	03	-	-	30	70	-	-	-	100	03	-	-	03
	Programming Lab – I	-	04	-	-	-	25	25	25	75	-	02	-	02
	Elective - I Laboratory	-	04	-	-	-	25	-	25	50	-	02	-	02
	Seminar / Mini Project	-	04	-	-	-	25	-	25	50	-	-	02	02
	Environmental Studies / Community Development	-	-	01	-	-	25	-	-	25	-	-	01	01
	Audit Course 5													
Total		15	12	01	150	350	100	25	75	700	15	04	03	22
Total Credit											15	04	03	22
Total		15	12	01	150	350	125	50	25	700	-	-	-	-
Semester-VI														
Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral/Presentation	Total	Lecture	PR/OR	Tutorial	Total
	Artificial Intelligence	03	-	-	30	70	-	-	-	100	03	-	-	03
	Digital and Social Media Marketing	03	-	-	30	70	-	-	-	100	03	--	-	03
	Machine Learning	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – II	03	-	-	30	70	-	-	-	100	03	-	-	03
	Programming Lab – II	-	04	-	-	-	25	50	-	75	-	02	-	02
	Elective – II Laboratory	-	04	-	-	-	25	25	-	50	-	02	-	02
	Internship / Skill Development / Global Certification Program	-	08	-	-	-	50	-	-	50	-	04	-	04
	Seminar & Technical Communication	-	02	-	-	-	25	-	25	50	-	-	01	01
	Audit Course 6													
Total		12	18	-	120	280	125	75	25	700	12	08	01	21
Total Credit											12	08	01	21

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Fourth Year of Computer Science and Design (2021 Course)
(With effect from Academic Year 2024-25)

Semester-VII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral/Presentation	Total	Lecture	PR/OR	Tutorial	Total
	Data Science	03	-	-	30	70	-	-	-	100	03	--	-	03
	Mobile Application Design	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – III	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – IV	03	-	-	30	70	-	-	-	100	03	-	-	03
	Data Science Lab	-	04	-	-	-	25	25	25	75	-	02	-	02
	Mobile Application Design Lab	-	04	-	-	-	25	25	-	50	-	02	-	02
	Elective-III Laboratory	-	04	-	-	-	25	25	25	75	-	02	-	02
	Project Stage I	-	04	-	-	-	50	-	-	50	-	02	-	02
	MOOC			02			50			50			02	02
	Audit Course 7													
	<u>Total</u>	12	16	02	120	280	175	75	50	700	12	08	02	22
Total Credit											12	08	02	22

Semester-VIII

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit Scheme			
		Lecture	Practical	Tutorial	Mid-Sem	End-Sem	Term work	Practical	Oral/Presentation	Total	Lecture	PR/OR	Tutorial	Total
	Cloud Computing & Cyber Security	03	-	-	30	70	-	-	-	100	03	--	-	03
	Data Visualization	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – V	03	-	-	30	70	-	-	-	100	03	-	-	03
	Elective – VI	03	-	-	30	70	-	-	-	100	03	-	-	03
	Computing Lab	-	04	-	-	-	50	25	-	75	-	01	-	01
	Elective – V Laboratory	-	02	-	-	-	50	25	-	75	-	01	-	01
	Project Stage II	-	12	-	-	-	75	-	50	125	-	06	-	06
	MOOC	-	-	-	-	-	25	-						
	Audit Course 8													
	<u>Total</u>	12	18	-	120	280	200	50	50	700	12	08		20
Total Credit											15	05	02	20

Electives					
Elective I(Lab)	Elective II (Lab)	Elective III (Lab)	Elective IV	Elective V (Lab)	Elective VI
TE Sem –I	TE Sem-II	BE –Sem I	BE –Sem I	BE –Sem II	BE –Sem II
Animation Design Principles	Multimedia Techniques and Tools	Computer Game Design	Computer Vision	AI & Gaming	Graphics Design
Virtual Reality	Augmented and Mixed Reality	3D Interaction Design in Virtual Reality	AR-VR and Gaming	Application Development using AR and VR	Usability Engineering
Audit Courses					
Audit Course 3	Audit Course 4	Audit Course 5	Audit Course 6	Audit Course 7	Audit Course 8
Road Safety	Water Management	Emotional Intelligence	Video Editing	Block Chain Technology	Information Retrieval
Engineering Economics	Intellectual Property Rights & Patents	Industrial Safety and Environment Consciousness	Sustainable Energy Systems	Entrepreneurship Development	Conversational Interfaces / Rural Technology
Smart Cities	The Science of Happiness	3D Printing / Quantum Computing	Leadership and Personality Development	Botnet of Things / Introduction to Drone	Social Media and Analytics
Foreign Language	Foreign Language	Foreign Language	Foreign Language	Foreign Language	Foreign Language
MOOC- Learn New Skills	MOOC- Learn New Skills	MOOC- Learn New Skills	MOOC- Learn New Skills	MOOC- Learn New Skills	MOOC- Learn New Skills