



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

## **COURSE STRUCTURE AND SYLLABUS**

**For UG –R20**

**B. TECH - COMPUTER SCIENCE & ENGINEERING**

*(Applicable for batches admitted from 2020-2021)*



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**COURSE STRUCTURE**

**I Year – I SEMESTER**

S. No	Course Code	Courses	L	T	P	Credits
1	HS	Communicative English	3	0	0	3
2	BS	Mathematics - I (Calculus And Differential Equations)	3	0	0	3
3	BS	Applied Physics	3	0	0	3
4	ES	Programming for Problem Solving using C	3	0	0	3
5	ES	Computer Engineering Workshop	1	0	4	3
6	HS	English Communication Skills Laboratory	0	0	3	1.5
7	BS	Applied Physics Lab	0	0	3	1.5
8	ES	Programming for Problem Solving using C Lab	0	0	3	1.5
<b>Total Credits</b>			<b>19.5</b>			

**I Year – II SEMESTER**

S. No	Course Code	Courses	L	T	P	Credits
1	BS	Mathematics – II (Linear Algebra And Numerical Methods)	3	0	0	3
2	BS	Applied Chemistry	3	0	0	3
3	ES	Computer Organization	3	0	0	3
4	ES	Python Programming	3	0	0	3
5	ES	Data Structures	3	0	0	3
6	BS	Applied Chemistry Lab	0	0	3	1.5
7	ES	Python Programming Lab	0	0	3	1.5
8	ES	Data Structures Lab	0	0	3	1.5
9	MC	Environment Science	2	0	0	0
<b>Total Credits</b>			<b>19.5</b>			



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**II Year – I SEMESTER**

S. No	Course Code	Courses	L	T	P	Credits
1	BS	Mathematics III	3	0	0	3
2	CS	Object Oriented Programming through C++	3	0	0	3
3	CS	Operating Systems	3	0	0	3
4	CS	Software Engineering	3	0	0	3
5	CS	Mathematical Foundations of Computer Science	3	0	0	3
6	CS	Object Oriented Programming through C++ Lab	0	0	3	1.5
7	CS	Operating Systems Lab	0	0	3	1.5
8	CS	Software Engineering Lab	0	0	3	1.5
9	SO	Skill oriented Course - I 1) Applications of Python - Num Py 2) Web Application Development Using FullStack - Frontend Development –Module -I	0	0	4	2
10	MC	Constitution of India	2	0	0	0
<b>Total Credits</b>			<b>21.5</b>			

**II Year – II SEMESTER**

II Year – II SEMESTER						
S. No	Course Code	Courses	L	T	P	Credits
1	BS	Probability and Statistics	3	0	0	3
2	CS	Database Management Systems	3	0	0	3
3	CS	Formal Languages and Automata Theory	3	0	0	3
4	ES	Java Programming	3	0	0	3
5	HS	Managerial Economics and Financial Accountancy	3	0	0	3
6	CS	Database Management Systems Lab	0	0	2	1
7	CS	R Programming Lab	0	1	2	2
8	ES	Java Programming Lab	0	0	3	1.5
9	SO	<b>Skill Oriented Course - II</b> 1) Applications of Python-Pandas <b>OR</b> 2) Web Application Development Using Full Stack -Frontend Development –Module-II	0	0	4	2
<b>Total Credits</b>			<b>21.5</b>			
10	Minor	Operating Systems <sup>§</sup>	3	0	2	4
11	Honors	Any course from the Pool, as per the opted track	4	0	0	4

§- Integrated Course



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<b>III B. Tech – I Semester</b>						
S.No	Course Code	Courses	Hours per week			Credits
			L	T	P	C
1	PC	Computer Networks	3	0	0	3
2	PC	Design and Analysis of Algorithms	3	0	0	3
3	PC	Data Warehousing and Data Mining	3	0	0	3
4	Open Elective/Job Oriented	<b>Open Elective-I</b> Open Electives offered by other departments/Optimization in Operations Research (Job oriented course)	3	0	0	3
5	PE	<b>Professional Elective-I</b> 1. Artificial Intelligence 2. Software Project Management 3. Distributed Systems 4. Advanced Unix Programming	3	0	0	3
6	PC	Data Warehousing and Data Mining Lab	0	0	3	1.5
7	PC	Computer Networks Lab	0	0	3	1.5
8	SO	<b>Skill Oriented Course - III</b> 1. Animation course: Animation Design 2. Continuous Integration and Continuous Delivery using Dev Ops	0	0	4	2
9	MC	Employability Skills-I	2	0	0	0
10	PR	<b>Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)</b>	0	0	0	1.5
<b>Total credits</b>						<b>21.5</b>
11	Minor	Database Management Systems <sup>§</sup>	3	0	2	4
12	Honors	Any course from the Pool, as per the opted track	4	0	0	4

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**III B. Tech – II Semester**

S.No	CourseCode	Courses	Hours per week			Credits	
			L	T	P		
1	PC	Machine Learning	3	0	0	3	
2	PC	Compiler Design	3	0	0	3	
3	PC	Cryptography and Network Security	3	0	0	3	
4	PE	<b>Professional Elective-II</b> 1.Mobile Computing 2.Big Data Analytics 3.Object Oriented Analysis and Design 4.Network Programming	3	0	0	3	
5		<b>Open Elective-II</b> Open Electives offered by other departments/ MEAN Stack Development (Job Oriented Course)	3	0	0	3	
6		PC	Machine Learning using Python Lab	0	0	3	1.5
7		PC	Compiler Design Lab	0	0	3	1.5
8	PC	Cryptography and Network Security Lab	0	0	3	1.5	
9	SO	<b>Skill Oriented Course - IV</b> 1.Big Data:Spark 2.MEAN Stack Technologies- Module I- MongoDB, Express.js, Angular JS Node.js and AJAX	0	0	4	2	
10		MC	Employability skills-II	2	0	0	0
<b>Total credits</b>						<b>21.5</b>	
<b>Industrial/Research Internship(Mandatory) 2 Months during summer vacation</b>							
11	Minor	Data Structures and Algorithms <sup>§</sup>	3	0	2	4	
12	Honors	Any course from the Pool, as per the opted track	4	0	0	4	
<b>Minor course through SWAYAM</b>			-	-	-	<b>2</b>	

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IV B. Tech –I Semester						
S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	PE	<b>Professional Elective-III</b> 1.Cloud Computing 2.Neural Networks and Soft Computing 3.Ad-hoc and Sensor Networks 4.Cyber Security & Forensics	3	0	0	3
2	PE	<b>Professional Elective-IV</b> 1. Deep Learning Techniques 2. Social Networks & Semantic Web 3. Computer Vision 4.MOOCs-NPTEL/SWAYAM	3	0	0	3
3	PE	<b>Professional Elective-V</b> 1.Block-Chain Technologies 2.Wireless Network Security 3.Ethical Hacking 4.MOOCs-NPTEL/SWAYAM	3	0	0	3
4	Open Elective /Job Oriented	<b>Open Elective-III</b> Open Electives offered by other departments/ API and Microservices (Job Oriented Course)	3	0	0	3
5	Open Elective /Job Oriented	<b>Open Elective-IV</b> Open Electives offered by other departments/ Secure Coding Techniques (Job Oriented Course)	3	0	0	3
6	HS	Universal Human Values 2: Understanding Harmony	3	0	0	3
7	SO	1.PYTHON: Deep Learning /APSSDC offered Courses 2.MEAN Stack Technologies-Module II- MongoDB, Express.js, Angular JS Node.js, and AJAX	0	0	4	2
8	PR	<b>Industrial/Research Internship 2 months (Mandatory) after third year (to be evaluated during VII semester</b>	0	0	0	3
<b>Total credits</b>						<b>23</b>
9	Minor	Software Engineering <sup>§</sup> / any other from PART-B (For Minor)	3	0	2	4
10	Honors	Any course from the Pool, as per the opted track	4	0	0	4
<b>Minor course through SWAYAM</b>			-	-	-	<b>2</b>

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IV B. Tech –II Semester						
S.No	Course Code	Course Title	Hours per week			Credits
			L	T	P	C
1	Project	Major Project Work, Seminar Internship	-	-	-	12
<b>Total credits</b>						<b>12</b>



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**Suggested Courses for Honors Program**

<p><b>POOL1- AI &amp; ML</b></p> <ol style="list-style-type: none"> <li>1. Mathematics for Machine Learning</li> <li>2. Text Mining and Time Series Analysis</li> <li>3. Natural Language Processing</li> <li>4. Reinforcement Learning</li> </ol>	<p><b>POOL2- Systems Engineering</b></p> <ol style="list-style-type: none"> <li>1. Data Communications and Information Coding Theory</li> <li>2. Internet of Things</li> <li>3. Service Oriented Architectures</li> <li>4. Design of Secure Protocols</li> <li>5. Network Coding</li> </ol>
<p><b>POOL3- Information Security</b></p> <ol style="list-style-type: none"> <li>1. Computational Number Theory</li> <li>2. Cryptanalysis</li> <li>3. Elliptic Curve Cryptography</li> <li>4. Introduction to Quantum Computing and Quantum Cryptography</li> <li>5. Public Key Infrastructure and Trust Management</li> <li>6. Information Security Analysis and Audit</li> </ol> <p>Principles of Cyber Security            Cloud and IoT Security            Web Security            Block Chain Architecture Design and Use Cases</p>	<p><b>POOL4 – Data Science</b></p> <ol style="list-style-type: none"> <li>1. Statistical Foundations for Data Science</li> <li>2. Mining Massive Data Sets</li> <li>3. Data Visualization</li> <li>4. Medical Image Data Processing</li> </ol>





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**Suggested Courses for MINOR Engineering in CSE**

**Note:**

1. Any THREE courses (*Any FOUR courses in case of MOOCS*) need to be studied from PART-A.
2. Any ONE course (*If it is in Regular Mode*) need to be studied from PART-B.
3. TWO, NPTEL courses of EIGHT week duration covering a total of 4 credits (offered by the department of CSE only), Student can register at any time after the completion of II B.Tech. I Sem.
4. Students can pursue suggested MOOC Courses via NPTEL from II B.Tech II Sem and onwards, by prior information to the concern.
5. **If sufficient numbers of students are not opted, as per the guidelines, dept can suggest students to pursue under MOOCS. In this case, department/students can select course such that there will not be any duplication.**

**Eligibility for Minor in CSE:**

PART A						
Regular Mode				MOOCS*		
S.No	Subject	L-T-P	Credits	Course available in NPTEL	NPTEL Link	Credits
1	Operating Systems	3-0-2	4	Operating Systems	<a href="https://onlinecourses.swayam2.ac.in/cec21_cs20/preview">https://onlinecourses.swayam2.ac.in/cec21_cs20/preview</a>	As recommended by the NPTEL (Dept need to verify the credits and suggest)
2	Data Structures and Algorithms	3-0-2	4	Data Structure and algorithms using Java	<a href="https://nptel.ac.in/courses/106105225">https://nptel.ac.in/courses/106105225</a>	
3	Software Engineering	3-0-2	4	Software Engineering	<a href="https://onlinecourses.swayam2.ac.in/cec21_cs21/preview">https://onlinecourses.swayam2.ac.in/cec21_cs21/preview</a>	
4	Computer Networks	3-0-2	4	Computer Networks	<a href="https://onlinecourses.swayam2.ac.in/cec22_cs05/preview">https://onlinecourses.swayam2.ac.in/cec22_cs05/preview</a>	
5	Database Management Systems	3-0-2	4	Data Base Management System	<a href="https://onlinecourses.nptel.ac.in/noc22_cs51/preview">https://onlinecourses.nptel.ac.in/noc22_cs51/preview</a>	
* If sufficient number of students are not available to offer, can pursue under MOOCS						



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<b>PART B</b>						
S.No	Subject	L-T-P	Credits	Course available in NPTEL	NPTEL Link	Credits
1	Computational Thinking	4-0-0	4			As recommended by the NPTEL (Dept need to verify the credits and suggest)
2	Object Oriented Programming through JAVA	3-0-2	4	Programming in JAVA	<a href="https://nptel.ac.in/courses/106105191">https://nptel.ac.in/courses/106105191</a>	
3	Data Analytics using Python	3-0-2	4	Data Analytics with Python	<a href="https://nptel.ac.in/courses/106107220">https://nptel.ac.in/courses/106107220</a>	
4	Artificial Intelligence	4-0-0	4	Artificial Intelligence: Knowledge Representation And Reasoning	<a href="https://nptel.ac.in/courses/106106140">https://nptel.ac.in/courses/106106140</a>	
				<b>OR</b>		
				An Introduction to Artificial Intelligence	<a href="https://onlinecourses.nptel.ac.in/noc22_cs56/preview">https://onlinecourses.nptel.ac.in/noc22_cs56/preview</a>	
5	Unix and Shell Programming	3-0-2	4			
6	Cloud Computing	4-0-0	4	Cloud computing	<a href="https://onlinecourses.nptel.ac.in/noc22_cs20/preview">https://onlinecourses.nptel.ac.in/noc22_cs20/preview</a>	
				<b>OR</b>		
				Cloud Computing and Distributed Systems (TWO Credits)	<a href="https://onlinecourses.nptel.ac.in/noc21_cs15/preview">https://onlinecourses.nptel.ac.in/noc21_cs15/preview</a>	
* If sufficient number of students are not available to offer, can pursue under MOOCS						



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**Open Electives to be offered by CSE for other Branches:**

<p><b>Open Elective-I:</b></p> <ol style="list-style-type: none"> <li>1. Data Structures</li> <li>2. Object Oriented Programming through JAVA</li> <li>3. Data Base Management Systems</li> <li>4. Computer Graphics</li> <li>5. Advanced UNIX Programming</li> <li>6. Computer Organization and Architecture</li> <li>7. Operating Systems</li> </ol>	<p><b>Open Elective-II:</b></p> <ol style="list-style-type: none"> <li>1. Python Programming</li> <li>2. Web Technologies</li> <li>3. Soft Computing</li> <li>4. Distributed Computing</li> <li>5. AI and ML for Robotics</li> <li>6. Computer Networks</li> <li>7. Big Data Analytics</li> <li>8. Computational Tools</li> </ol>
<p><b>Open Elective-III:</b></p> <ol style="list-style-type: none"> <li>1. AI Tools &amp; Techniques</li> <li>2. Image Processing</li> <li>3. Information Security</li> <li>4. Mobile Application Development</li> <li>5. Data Science</li> <li>6. Cyber Security</li> <li>7. Introduction to Internet of Things</li> </ol>	<p><b>Open Elective-IV:</b></p> <ol style="list-style-type: none"> <li>1. MEAN Stack Technologies</li> <li>2. Deep Learning Techniques</li> <li>3. Cloud computing with AWS</li> <li>4. Block Chain Technologies</li> <li>5. Cryptography &amp; Network Security</li> <li>6. Introduction to Machine Learning</li> <li>7. Machine Learning with Python</li> </ol>