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

DEPARTMENT OF CSE - DATA SCIENCE

COURSE STRUCTURE

For UG – R20

B. Tech - COMPUTER SCIENCE AND ENGINEERING with Specialization

DATA SCIENCE

(Applicable for batches admitted from 2020-2021)

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I Year – I SEMESTER

S. No	Course Code	Subjects	L	T	P	Credits
1	HS1101	Communicative English	3	0	0	3
2	BS1101	Mathematics – I	3	0	0	3
3	BS1102	Applied Chemistry	3	0	0	3
4	ES1101	Programming for Problem Solving using C	3	0	0	3
5	ES1102	Computer Engineering Workshop	1	0	4	3
6	HS1102	English Communication Skills Laboratory	0	0	3	1.5
7	BS1103	Applied Chemistry Lab	0	0	3	1.5
8	ES1103	Programming for Problem Solving using C Lab	0	0	3	1.5
9	MC1101	Environmental Science*	2	0	0	0
		Total Credits	**15**	**0**	**13**	**19.5**

I Year – II SEMESTER

S. No	Course Code	Subjects	L	T	P	Credits
1	BS1201	Mathematics – II	3	0	0	3
2	BS1202	Applied Physics	3	0	0	3
3	ES1201	Digital Logic Design	3	0	0	3
4	ES1202	Python Programming	3	0	0	3
5	CS1201	Data Structures	3	0	0	3
6	BS1203	Applied Physics Lab	0	0	3	1.5
7	ES1203	Python Programming Lab	0	0	3	1.5
8	CS1202	Data Structures Lab	0	0	3	1.5
9	MC1201	Constitution of India *	2	0	0	0
		Total Credits	**17**	**0**	**9**	**19.5**

*Internal Evaluation

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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	Mathematical Foundations of Computer Science	3	0	0	3
3	CS	Fundamentals of Data Science	3	0	0	3
4	CS	Object Oriented Programming with Java	3	0	0	3
5	CS	Database Management Systems	3	0	0	3
6	CS	Fundamentals of Data Science Lab	0	0	3	1.5
7	CS	Object Oriented Programming with Java Lab	0	0	3	1.5
8	CS	Database Management Systems Lab	0	0	3	1.5
9	SO	Mobile App Development	0	0	4	2
10	MC	Essence of Indian Traditional Knowledge	2	0	0	0
		Total Credits	**17**	**0**	**13**	**21.5**

II Year – II SEMESTER						
S. No	Course Code	Courses	L	T	P	Credits
1	BS	Probability and Statistics	3	0	0	3
2	CS	Computer Organization	3	0	0	3
3	CS	Data Warehousing and Mining	3	0	0	3
4	ES	Formal Languages and Automata Theory	3	0	0	3
5	HS	Managerial Economics and Financial Accountancy	3	0	0	3
6	CS	R Programming Lab	0	0	3	1.5
7	CS	Data Mining using Python Lab	0	0	3	1.5
8	ES	Web Application Development Lab	0	0	3	1.5
9	SO	MongoDB	0	0	4	2
		Total Credits				**21.5**
10	Minor	Fundamentals of Data Science $	**3**	**0**	**2**	**4**

$- Integrated Course

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S. No	Course Code	Courses	Hours per week			Credits
		III B. Tech – I Semester				
			L	T	P	C
1	PC	Compiler Design	3	0	0	3
2	PC	Operating Systems	3	0	0	3
3	PC	Machine Learning	3	0	0	3
4	Open Elective/ Job Oriented	**Open Elective-I** Open Electives offered by other departments/ Optimization in Operations Research (Job oriented course)	3	0	0	3
5	PE	**Professional Elective-I** 1. Software Engineering 2. Object Oriented Analysis and Design 3. DevOps 4. Internet of Things	3	0	0	3
6	PC	Operating Systems & Compiler Design Lab	0	0	3	1.5
7	PC	Machine Learning Lab	0	0	3	1.5
8	SO	**Skill Oriented Course - III** 1. Continuous Integration and Continuous Delivery using DevOps 2. Helica Insight	0	0	4	2
9	MC	Employability Skills-I	2	0	0	0
10	PR	**Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester**	0	0	0	1.5
					Total credits	21.5
11	Minor	Data Warehousing and Data Mining $^{\$}$	3	0	2	4

$- Integrated Course

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S. No	Course Code	Courses	Hours per week			Credits
			L	**T**	**P**	**C**
1	PC	Computer Networks	**3**	**0**	**0**	**3**
2	PC	Big Data Analytics	**3**	**0**	**0**	**3**
3	PC	Design and Analysis of Algorithms	**3**	**0**	**0**	**3**
4	PE	**Professional Elective-II** 1. Deep Learning 2. Software Project Management 3. Distributed Systems 4. Data Wrangling in Data Science 5. ETL Principles	**3**	**0**	**0**	**3**
5	Open Elective/Job Oriented	**Open Elective-II** Open Electives offered by other departments/ MEAN Stack Development (Job Oriented Course)	**3**	**0**	**0**	**3**
6	PC	Computer Networks Lab	**0**	**0**	**3**	**1.5**
7	PC	Big Data Analytics Lab	**0**	**0**	**3**	**1.5**
8	PC	Deep Learning with Tensorflow	**0**	**0**	**3**	**1.5**
9	SO	**Skill Oriented Course - IV** 1. MEAN Stack Technologies-Module I- MongoDB, Express.js, Angular JS Node.js and AJAX 2. ETL Design Procedures-Spark	**0**	**0**	**4**	**2**
10	MC	Employability Skills-II	**2**	**0**	**0**	**0**
Total credits						**21.5**
Industrial/Research Internship(Mandatory) 2 Months during summer vacation						
11	Minor	Data Science Applications $^{\$}$	**3**	**0**	**2**	**4**
		Minor courses through SWAYAM	**0**	**0**	**0**	**2**

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III B. Tech – II Semester

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S. No	Course Code	Course Title	Hours per week			Credits
		IV B. Tech –I Semester (Tentative)				
			L	**T**	**P**	**C**
1	PE	**Professional Elective-III** 1. Reinforcement Learning 2. Nature Inspired Computing Techniques 3. Social Media Analytics 4. Block Chain Technologies	3	0	0	3
2	PE	**Professional Elective-IV** 1. SnowFlake Cloud Analytics 2. Cloud Computing 3. Information Retrieval Systems 4. NOSQL Databases	3	0	0	3
3	PE	**Professional Elective-V** 1. Social Network Analysis 2. Recommender Systems 3. AI Chatbots 4. Data Visualization	3	0	0	3
4	Open Elective /Job Oriented	**Open Elective-III** Open Electives offered by other departments/ API and Microservices (Job Oriented Course)	3	0	0	3
5	Open Elective /Job Oriented	**Open Elective-IV** 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.Machine Learning with Go (Infosys Spring Board) 2.MEAN Stack Technologies-Module II- MongoDB, Express.js, Angular JS Node.js, and AJAX	0	0	4	2
8	PR	**Industrial/Research Internship 2 months (Mandatory) after third year** **(to be evaluated during VII semester**	0	0	0	3
		Total credits				**23**
9	Minor	Data Wrangling in Data Science$^{\$}$	3	0	2	4
		Minor courses through SWAYAM	**0**	**0**	**0**	**2**

$-$ Integrated Course

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

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Suggested Courses MINOR Engineering in B.Tech. CSE- DS

Note:
1. TWO, NPTEL courses of EIGHT week duration covering a total of 4 credits (offered by CSE Department only), Student can register at any time after the completion of II B.Tech. I Sem.

Eligibility for Minor in CSE-DS:-

S. No.	Subject Title	Credits
1	Fundamentals of Data Science	4
2	Data Warehousing and Data Mining	4
3	Data Science Applications	4
4	Data Wrangling in Data Science	4
5	MOOCS Courses ** 1. Cloud Computing (NPTEL) (https://nptel.ac.in/courses/106105167) 2. Scalable Data Science (NPTEL) (https://nptel.ac.in/courses/106105186) 3. Distributed Systems (NPTEL) (https://nptel.ac.in/courses/106106168) 4. Big Data Computing (NPTEL) (https://nptel.ac.in/courses/106104189)	4
	Total	20

**Choose 02 MOOCS courses @ 2 credits each from SWAYAM/NPTEL