B.TECH. CURRICULUM

ACADEMIC YEAR: 2025–26

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

Undergraduate Rules and Regulations – 2024 -R25 (URR24 -R25)

In accordance with the National Education Policy 2020
w.e.f AY 2025-26

Regulations Governing the
Choice Based Credit System and
Multiple Entry and Multiple Exit Options
with
Competancy-Focused Outcome Based Curriculum (CF-OBC)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 506 015

TELANGANA

(UGC Autonomous Institute Under Kakatiya University, Warangal)

Abbreviations

L	Lecture Hour	O	Outside the Class Work (Self Study) Hours
T	Tutorial Hour	E	Total Engagement in Hours
P	Practical Hour	C	Credit Assigned

I SEMESTER

Stream – II

S. No.	Category	Course Code	Course Title	Lectures / week					Credits
				L	T	P	O	E	C
-	IKSC	U24IK100	Universal Human Values – I (AICTE Mandated Student Induction Programme)						-
1	BSC	U24MH101	Differential Calculus and Ordinary Differential Equations	2	1	-	6	9	3
2	BSC	U24CY102B	Engineering Chemistry	2	1	2	5	10	4
3	ESC	U24EC111	Switching Theory and Logic Design	2	1	-	4	7	3
4	ESC	U24DS104	Programming for Problem Solving with C	2	1	2	5	10	4
5	HSMC	U24MH105	English Communication and Report Writing	2	-	-	3	5	2
6	VAC	U24VA106	Sports & Yoga	-	-	2	2	4	1
7	ESC	U24ME107	Engineering Graphics through CAD	-	-	2	2	4	1
8	ELC	U24EL108	Practicum-I	-	-	-	4	4	1
9	VAC	U24VA109	SEA – I / SAA-I	-	-	-	2	2	1
10	AEC	U24AE110	Expert Talk Series-1	-	-	-	1	1	1
			Total:	10	4	8	34	56	21
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				NIL					

Pool – III (Chemistry)		
S. No.	Course Code	Course Title
1.	U24CY102A	Engineering Chemistry *(for Mechanical Engineering)*
2.	U24CY102B	Engineering Chemistry *(Common to CSM, CSD, CSN, CSO & IT)*

II SEMESTER

Stream-II

S. No.	Category	Course Code	Course Title	Lectures / week					Credits
				L	T	P	O	E	C
1	BSC	U24MH201	Matrix Theory and Vector Calculus	2	1	-	6	9	3
2	BSC	U24PY202B	Engineering Physics	2	1	-	5	8	3
3	PCC	U24DS203	Computer Architecture and Organization	2	1	-	4	7	3
4	ESC	U24DS204	Data Structures through C	2	1	-	5	8	3
5	ESC	U24EE205B	Basic Electrical Engineering	2	1	-	5	8	3
6	VAC	U24CY206	Environmental Studies	2	-	-	2	4	-
7	AEC	U24AE207	Idea Lab Makerspace	-	-	2	2	4	1
8	SEC	U24SE208	Programming Skill Development (PSD) Lab - 1	-	-	2	2	4	1
9	BSC	U242PY209	Engineering Physics Laboratory	-	-	2	4	6	1
10	ESC	U24DS210	Data Structures through C Laboratory	-	-	2	2	4	1
11	ESC	U24EE211	Basic Electrical Engineering Laboratory	-	-	2	1	3	1
Total:				12	5	10	38	65	20
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				NIL					

Pool – I (Physics)		
S. No.	Course Code	Course Title
1.	U24PY202A	Engineering Physics *(for Mechanical Engineering)*
2.	U24PY202B	Engineering Physics *(Common to CSM, CSD, CSN, CSO & IT)*

Pool – II (Basic Electrical Engineering)		
S. No.	Course Code	Course Title
1.	U24EE205A	Basic Electrical and Electronics Engineering *(for Mechanical Engineering)*
2.	U24EE205B	Basic Electrical Engineering *(Common to CSM, CSD, CSN, CSO & IT)*

Bridge Courses for exit:

Successful completion of two subjects (6-Credits)during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

A. After First Year: (UG Certificate in CSE(Data Science)
(i) The candidate should pass any two of the following additional courses (ITI Level) during the 2-Months internship at institute

Exit Option to Qualify UG Certificate in CSE(Data Science): Any Two (02) Courses during the 2 - Months internship										
S. No.	Category	Course Code	Course Title	L	T	P	O	E	C
1	PCC	U24DS212X	Introduction to Python Programming	2	-	2	-	4	3
2	PCC	U24DS213X	Programming with Java	2	-	2	-	4	3
3	PCC	U24DS214X	Introduction to Databases	2	-	2	-	4	3
4	PCC	U24DS215X	Fundamentals of Computer Networks	2	-	2	-	4	3
5	PCC	U24DS216X	Any other course approved by BoS Chair and Dean AA	2	-	2	-	4	3

(OR)

(ii) Any two suitable skill based courses to qualify for Certification.

Exit Option to Qualify UG Certificate in CSE(Data Science): Any Two (02) Skill based Courses -:										
S. No.	Category	Course Code	Course Title	L	T	P	O	E	C
1	SEC	U24SE217X	Core Python Programming Reference: https://www.netacad.com/courses/programming/pcap-programming-essentials-python	-	-	6	-	6	3
2	SEC	U24SE218X	Java Fundamentals Reference: https://learn.oracle.com/ols/learning-path/java-fundamentals/55593/55578	-	-	6	-	6	3
3	SEC	U24SE219X	Database Foundations Reference: https://academy.oracle.com/en/solutions-curriculum-database.html	-	-	6	-	6	3
4	SEC	U24SE220X	Introduction to Unix Operating System Reference: https://www.coursera.org/learn/hands-on-introduction-to-linux-commands-and-shell-scripting	-	-	6	-	6	3
5	SEC	U24SE221X	Networking Fundamentals Reference: https://www.netacad.com/courses/networking/ccna-introduction-networks	-	-	6	-	6	3
6	SEC	U24SE222X	Any other skill based course approved by BoS Chair and Dean AA	-	-	6	-	6	3

III SEMESTER (STREAM -II)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	BSC	U24MH301F	Essential Mathematics and Statistics for Data Science	2	1	-	3	3
2	PCC	U24DS302	Advanced Data Structures	3	1	-	4	4
3	PCC	U24DS303	Operating Systems	2	1	-	3	3
4	PCC	U24DS304	Automata Theory and Compiler Design	2	1	-	3	3
5	PCC	U24DS305	Object Oriented Programming through Java	2	1	-	3	3
6	VAC	U24VA306B	Soft & Interpersonal Skills Laboratory	-	-	2	2	1
7	SEC	U24SE307	Programming Skill Development (PSD) Lab - 2	-	-	2	2	1
8	PCC	U24DS308	Advanced Data Structures Laboratory	-	-	2	2	1
9	PCC	U24DS309	Object Oriented Programming through Java Laboratory	-	-	2	2	1
Total:				**11**	**5**	**8**	**24**	**20**
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				**"Programming in C" bridge course for Non-CS/IT Lateral Entry students**				

Branch Specific Mathematics (Pool - XIII)		
S. No.	**Course Code**	**Course Title**
1.	U24MH301A	Numerical and Statistical Methods***(for CE)***
2.	U24MH301B	Applied Mathematics***(for ME)***
3.	U24MH301D	Discrete Mathematics and Probability Statistics ***(for CSN, CSO & IT)***
4.	U24MH301E	Essential Mathematics and Statistics for Machine learning ***(for CSM)***
5.	U24MH301F	Essential Mathematics and Statistics for Data science ***(for CSD)***

IV SEMESTER (STREAM -II)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	PCC	U24DS401	Database Management Systems	3	1	-	4	4
2	PCC	U24DS402	Artificial Intelligence	2	1	-	3	3
3	PCC	U24DS403	Software Engineering	2	1	-	3	3
4	PCC	U24DS404	Computer Networks	2	1	-	3	3
5	PCC	U24DS405	Python Programming	2	1	-	3	3
6	PCC	U24DS406	Design and Analysis of Algorithms	2	1	-	3	3
7	PCC	U24DS407_R25	Database Management Systems Laboratory	-	-	2	2	1
8	PCC	U24DS408_R25	Artificial Intelligence Laboratory	-	-	2	2	1
9	PCC	U24DS409	Python Programming Laboratory	-	-	2	2	1
10	VAC*	U24CY411*	Environmental Studies* (For lateral entry students only)	2*	-	-	2*	-
			Total (For lateral entry students only)	13	6	6	25	22
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				NIL				

Bridge Courses for exit:

Successful completion of twosubjects (6-Credits) during 2-months internship at the institute
OR
Successful completion of two suitable skill based courses (external) to qualify for Certification

B. After Second Year: (UG Diploma in CSE (Data Science)

(i) The candidate should pass any two of the following additional courses (Diploma Level) during the 2-Months internship at institute

S. No.	Category	Course Code	Course Title	L	T	P	E	C
1	PCC	U24DS412X	Machine Learning	2	-	2	4	3
2	PCC	U24DS413X	Computer Vision and Image Processing	2	-	2	4	3
3	PCC	U24DS414X	Data Warehousing and Data Mining	2	-	2	4	3
4	PCC	U24DS415X	Web Technologies	2	-	2	4	3
5	PCC	U24DS416X	Any other course approved by BoS Chair and Dean AA	2	-	2	4	3

(OR)

(ii) Any two suitable skill based courses to qualify for Diploma.

S. No.	Category	Course Code	Course Title	L	T	P	E	C
1	SEC	U24SE417X	Introduction to Machine Learning using Python Reference:https://www.shiksha.com/online-courses/machine-learning-course-dcodl2	-	-	6	6	3
2	SEC	U24SE418X	Introduction to Computer Vision Reference:https://onlinecourses.nptel.ac.in/noc19_cs58/preview	-	-	6	6	3
3	SEC	U24SE419X	R Programming for Data Analytics Reference:https://onlinecourses.nptel.ac.in/noc19_ma33/preview	-	-	6	6	3
4	SEC	U24SE420X	Pattern Discovery in Data Mining Reference:https://www.coursera.org/learn/data-patterns	-	-	6	6	3
5	SEC	U24SE421X	Introduction to Web Programming Reference:https://www.shiksha.com/online-courses/web-developer-	-	-	6	6	3

S. No.	Category	Course Code	Course Title	L	T	P	E	C
			version-2-course-nsnaskl2					
6	SEC	U24SE422X	Software Testing Methodologies Reference:https://onlinecourses.nptel.ac.in/noc22_cs61/preview	-	-	6	6	3
7	SEC	U24SE423X	Any other course approved by BoS Chair and Dean AA	-	-	6	6	3

B. Tech Honours with Research:

- Students opting for B. Tech Honours with Research, shall undergo a 2-Month Mandatory Research Internship-I (5 Credits) at respective department during the summer vacation after IV Semester.

V SEMESTER (STREAM -II)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	OE	U24OE501X-SDG	Open Elective –SDGB (Pool - XVI)	2	1	-	3	3
2	PCC	U24DS502	Web Programming	2	1	-	3	3
3	PCC	U24DS503_R25	Internet of Things	2	1	-	3	3
4	PCC	U24DS504	Data Warehousing and Data Mining	2	1	-	3	3
5	IKSC	U24IK506B	Universal Human Values-II	2	-	-	2	2
6	PCC	U24DS509	Web Programming Laboratory	-	-	2	2	1
7	PCC	U24DS510_R25	Internet of Things Laboratory	-	-	2	2	1
8	PCC	U24DS511_R25	Data Warehousing and Data Mining Laboratory	-	-	2	2	1
9	ELC	U24DS512	Seminar	-	-	2	2	1
Total:				10	4	8	22	18
Additional Learning@: Maximum credits allowed for Honours/Minor				-	-	-	-	5
Total credits for Honours/Minor students:				-	-	-	-	23
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				**NIL**				

Pool - XVI Sustainable Development Goals Basket (OE - SDGB)		
S. No.	**Course Code**	**Course Title**
1.	**U24OE501A-SDG**	Sustainable Waste Management and Circular Economy
2.	**U24OE501B-SDG**	Carbon Reduction & Net Zero
3.	**U24OE501C-SDG**	Renewable Energy Systems
4.	**U24OE501D-SDG**	Sustainable Embedded Solutions for Smart Cities and Healthcare
5.	**U24OE501Z-SDG**	Any other course approved by BoS Chair and Dean AA

VI SEMESTER (STREAM-II)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	OE	U24OE601X – S&EB	Open Elective – S&EB (from Pool -XVIII)	2	1	-	3	3
2	PEC	U24DS602	Program Elective –I / MOOCs-I	2	1	-	3	3
3	PCC	U24DS603	Machine Learning	2	1	-	3	3
4	PCC	U24DS604	MLOps	2	1	-	3	3
5	PCC	U24DS605	Big Data Analytics	2	1	-	3	3
6	IKSC	U24IK606B	Essence of Indian Traditional Knowledge	2	-	-	2	2
6	HSMC	U24MH608	Technical English	-	-	2	2	1
7	PCC	U24DS609	Machine Learning Laboratory	-	-	2	2	1
8	PCC	U24DS610	MLOps Laboratory	-	-	2	2	1
9	PCC	U24DS611	Big Data Analytics Laboratory	-	-	2	2	1
10	ELC	U24DS612	Mini Project	-	-	2	2	1
Total:				12	5	10	27	22
Additional Learning@:Maximum credits allowed for Honours/Minor				-	-	-	-	5
Total credits for Honours/Minor students:				**-**	**-**	**-**	**-**	**27**
Summer/ Inter-semBridge Courses (Approved by BoS and Dean,AA): 1 week to 10 days: 1 credit to each Bridge course under additional learning (will be printed on grade sheet)				**NIL**				

Pool -XVIII Startups & Entrepreneurship Basket (OE - S&EB)		
S. No.	**Course Code**	**Course Title**
1.	**U24OE601A-SEB**	Design Thinking
2.	**U24OE601B-SEB**	Innovative Product Design and Development
3.	**U24OE601C-SEB**	Entrepreneurship
4.	**U24OE601D-SEB**	Design Studio
5.	**U24OE601Z-SEB**	Any other course approved by BoS Chair and Dean AA

Bridge Courses for exit:

Successful completion of two subjects (6-Credits) during 2-months internship at the institute

OR

Successful completion of two suitable skill based courses (external) to qualify for Certification

C. After Third Year: (B. Voc. in CSE (Data Science))

(i) The candidate should pass any two of the following additional courses (Degree Level) during the 2-Months internship at institute

Exit Option to Qualify B. Voc in CSE (Data Science):Any Two (02) Courses during the 2 - Months internship								
S. No.	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**E**	**C**
1	PCC	U24DS613X	Natural Language Processing	2	-	2	4	3
2	PCC	U24DS614X	Generative AI : Concepts and Applications	2	-	2	4	3
3	PCC	U24DS615X	Cloud Computing	2	-	2	4	3
4	PCC	U24DS616X	Exploratory Data Analysis	2	-	2	4	3
5	PCC	U24DS617X	Any other course approved by BoS Chair and Dean AA	2	-	2	4	3

(OR)

(ii) Any two suitable skill based courses to qualify for B. Voc in CSE (Data Science) Degree.

Exit Option to Qualify B. Voc in CSE (Data Science): Any Two (02) Skill based Courses -:								
S. No.	**Category**	**Course Code**	**Course Title**	**L**	**T**	**P**	**E**	**C**
1	SEC	U24SE618X	Android Application Development Reference: https://nsdcindia.org/telecom-terminal-equipment-application-developer-android-application	-	-	6	6	3
2	SEC	U24SE619X	Big Data &Hadoop Reference: https://onlinecourses.nptel.ac.in/noc20_cs92/preview	-	-	6	6	3
3	SEC	U24SE620X	Introduction to Robotic Process Automation Reference: https://onlinecourses.nptel.ac.in/noc20_de11/preview	-	-	6	6	3
4	SEC	U24SE621X	Amazon Web Services Reference: https://www.coursera.org/specializations/aws-fundamentals	-	-	6	6	3
5	SEC	U24SE622X	Cyber Security Reference: https://onlinecourses.swayam2.ac.in/nou19_cs08/preview	-	-	6	6	3
6	SEC	U24SE623X	Augmented Reality & Virtual Reality Reference: https://www.coursera.org/learn/ar	-	-	6	6	3
7	SEC	U24SE624X	Any other skill based course approved by BoS Chair and Dean AA	-	-	6	6	3

(Note to HoDs on PCC: Under PCC the departments shall plan appropriate courses upto 6th semester covering GATE syllabus).

VII SEMESTER (STREAM -II)

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	OE	U24OE701X -MB	Open Elective –MB	2	1	-	3	3
2	PEC	U24DS702	Program Elective - II/ MOOCs-II	2	1	-	3	3
3	PCC	U24DS703	Generative AI: Concepts and Applications	2	1		3	3
4	PCC	U24DS704	Cloud Computing	2	1	-	3	3
5	PCC	U24DS705	Natural Language Processing	2	1	-	3	3
6	PCC	U24DS706	Generative AI: Concepts and Applications Laboratory	-	-	2	2	1
7	PCC	U24DS707	Natural Language Processing Laboratory	-	-	2	2	1
8	ELC	U24DS708	Internship Evaluation	-	-	2	2	1
9	ELC	U24DS709	Major Project Phase-1 / Industrial Internship -1	-	-	8	8	4
Total:				10	5	14	29	22
Additional Learning@:Maximum credits allowed for Honours/Minor				-	-	-	-	4
Total credits for Honours/Minor students:				-	-	-	-	26

Pool -XX Management Courses Basket (OE-MB)		
S. No.	Course Code	Course Title
1.	U24OE701A-MB	Management Economics and Accountancy
2.	U24OE701B-MB	Engineering Finance
3.	U24OE701C-MB	OrganisationalBehaviour
4.	U24OE701D-MB	E-Commerce and Digital Marketing
5.	U24OE701Z-MB	Any other course approved by BoS Chair and Dean AA

@ List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

B. Tech Honours with Research

(i). Students opting for B. Tech Honours with Research, shall complete Research Methodology Course (4 Credits) through MOOCS (OR) a workshop / FDP of not less than one week on "Research Methodologies" (4 Credits).

(ii). Internship Evaluation for the students opting B. Tech Honours with Research,will be done on the 2-Month Research internship-II.

VIII SEMESTER

S. No.	Category	Course Code	Course Title	Lectures / week				Credits
				L	T	P	E	C
1	PEC	U24DS801	Program Elective - III / MOOCs-III	2	1	-	3	3
2	PEC	U24DS802	Program Elective - IV / MOOCs-IV	2	1	-	3	3
3	PCC	U24DS803	Cybersecurity and Digital Forensics	2	1	-	3	3
4	ELC	U24DS804	Major Project, Phase – 2 / Industrial Internship - 2	-	-	12	12	6
Total:				6	3	12	21	15
Additional Learning@:Maximum credits allowed for Honours/Minor				-	-	-	-	4
Total credits for Honours/Minor students:				-	-	-	-	19

@ List of courses for additional learning through MOOCs towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula

B. Tech Honours with Research

Students opting for B. Tech Honours with Research, shall Publish a research paper in reputed journal indexed by SCI / SCOPUS/Web of Science (4 Credits).

SUMMARY

SEMESTER	I	II	III	IV	V	VI	VII	VIII	TOTAL
CREDITS	21	20	20	22	18	22	22	15	160

PROGRAM ELECTIVE COURSES (PEC)

There are four slots allotted to Program Elective Courses (PECs).

VERTICAL/ PROFESSIONAL ELECTIVE	PROFESSIONAL ELECTIVE1 (PE1)	PROFESSIONAL ELECTIVE1 (PE2)	PROFESSIONAL ELECTIVE1 (PE3)	PROFESSIONAL ELECTIVE1 (PE4)
VERTICAL 1: Data Mining and Analytics	U24DS602A: Multi-Task and Meta Learning	U24DS702A: Exploratory Data Analysis	U24DS801A: Web and Social Media Analytics	U24DS802A: Text and speech analytics
	(OR)			
	Equivalent MOOC approved by BoS Chair and Dean AA			
VERTICAL 2: Computer Communications and Cyber Security	U24DS602B: Cryptography and Network Security	U24DS702B: Ethical Hacking	U24DS801B: Block Chain Technologies	U24DS802B: Software Defined Networking
	(OR)			
	Equivalent MOOC approved by BoS Chair and Dean AA			
VERTICAL 3: Internet of Things	U24DS602C: IoT Architectures and Protocols	U24DS702C: Privacy and Security in IoT	U24DS801C: Industrial IoT	U24DS802C: Edge and Fog Computing
	(OR)			
	Equivalent MOOC approved by BoS Chair and Dean AA			
VERTICAL 4: Intelligent Systems	U24DS602D: Computer Vision and Image Processing	U24DS702D: Quantum Computing	U24DS801D: Robotic Process Automation	U24DS802D: Explainable Artificial Intelligence
	(OR)			
	Equivalent MOOC approved by BoS Chair and Dean AA			
VERTICAL 5: Human - Centered AI	U24DS602E: Human Computer Interaction	U24DS702E: Cognitive Computing	U24DS801E: Responsible AI	U24DS802E: Conversational AI
	(OR)			
	Equivalent MOOC approved by BoS Chair and Dean AA			