

Regulations 2019

FLEXIBLE CHOICE BASED CREDIT SYSTEM

LIST OF COURSES OFFERED AS SPECIALIZATION (MINOR)

S.No	Offered by	Specialization in	Course Code R2019	Course Title	L - Hrs/week	T - Hrs/week	P - Hrs/week	Credits	Prerequisite	CGPA / Non - CGPA	Course Type
1	AI&DS	Data Science	19AI403	Introduction to Data Science	2	0	2	3	19CS301	CGPA	TIP (6 Expts)
2	AI&DS	Data Science	19MA211	Statistics and Numerical Methods	3	0	2	4	-	CGPA	TIP (6 Expts)
3	AI&DS	Data Science	19AI555	Exploratory Data Analysis	2	0	2	3	-	CGPA	TIP (6 Expts)
4	AI&DS	Data Science	19AI556	Recommender Systems	2	0	2	3	-	CGPA	TIP (6 Expts)
5	AI&DS	Data Science	19AI557	Neural Networks and Deep Learning	2	0	2	3	-	CGPA	TIP (6 Expts)
6	AI&DS	Data Science	19AI558	Text and Speech Analysis	2	0	2	3	-	CGPA	TIP (6 Expts)
7	AI&DS	Data Science	19AI517	Business Analytics	2	0	2	3	-	CGPA	TIP (6 Expts)
8	AI&DS	Data Science	19AI559	Image and Video Analytics	2	0	2	3	-	CGPA	TIP (6 Expts)
9	AI&DS	Data Science	19AI503	Computer Vision	2	0	2	3	19CS301	CGPA	TIP (6 Expts)
10	AI&DS	Data Science	19AI516	Big Data Mining and Analysis	2	0	2	3	19AI408/ 19CS410/19IT405/19AI40	CGPA	TIP (6 Expts)
11	AI&DS	Data Science	19AI301	Python Programming	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
12	AI&DS	Data Science	19CS408	Software Engineering	3	0	2	4	-	CGPA	TIP (6 Expts)

13	AI&DS	Data Science	19CS556	Core Computing Concepts	2	0	2	3	-	CGPA	TIP (6 Expts)
14	AI&ML	Emerging Technologies	19AI558	Text and Speech Analysis	2	0	2	3	-	CGPA	TIP (6 Expts)
15	AI&ML	Emerging Technologies	19CS549	UI and UX Design	2	0	2	3	-	CGPA	TIP (6 Expts)
16	AI&ML	Emerging Technologies	19AI509	Concepts of Virtual And Augmented Reality	2	0	2	3	-	CGPA	TIP (6 Expts)
17	AI&ML	Emerging Technologies	19CS565	Robotic Process Automation	2	0	2	3	-	CGPA	TIP (6 Expts)
18	AI&ML	Emerging Technologies	19CS529	Quantum Computing	3	0	0	3	19CS301/19 CS303	CGPA	Theory
19	AI&ML	Emerging Technologies	19CS547	Fundamentals of Cryptocurrency	3	0	0	3	-	CGPA	Theory
20	AI&ML	Emerging Technologies	19AI513	Game Programming	2	0	4	4	19CS401	CGPA	TIP (10 Expts)
21	AI&ML	Emerging Technologies	19AI545	Modern Web Application Development	2	0	2	3	19CS410 / 19AI401 / 19AI414 /	CGPA	TIP (6 Expts)
22	AI&ML	Emerging Technologies	19CS417	Ethical Hacking Techniques	2	0	2	3	-	CGPA	TIP (6 Expts)
23	AI&ML	Emerging Technologies	19AI308	Object Oriented Programming using C#	2	0	2	3	19AI304	CGPA	TIP (6 Expts)
24	AI&ML	Emerging Technologies	19AI410	Introduction to Machine Learning	2	0	2	3	-	CGPA	TIP (6 Expts)
25	AI&ML	Emerging Technologies	19AI306	Object Oriented Programming using C++	2	0	2	3	19AI304	CGPA	TIP (6 Expts)
26	AI&ML	Emerging Technologies	19CS556	Core Computing Concepts	2	0	2	3	-	CGPA	TIP (6 Expts)
27	BME	Biomedical Technology	19BM533	Human Physiology	3	0	0	3	-	CGPA	Theory
28	BME	Biomedical Technology	19BM534	Medical Instrumentation	3	0	0	3	-	CGPA	Theory
29	BME	Biomedical Technology	19BM535	Medical Imaging Technology	3	0	0	3	-	CGPA	Theory
30	BME	Biomedical Technology	19BM526	Medical Waste Management	3	0	0	3	-	CGPA	Theory

31	BME	Biomedical Technology	19BM536	Diagnostic and Therapeutic Equipment	3	0	0	3	-	CGPA	Theory
32	BME	Biomedical Technology	19BM537	Hospital Management and Safety	3	0	0	3	-	CGPA	Theory
33	BME	Biomedical Technology	19BM538	Biometric Technology	3	0	0	3	-	CGPA	Theory
34	Chemical	Sustainable Engineering	19CH625	Environmental Remediation Technologies	3	0	0	3	-	CGPA	Theory
35	Chemical	Sustainable Engineering	19CH626	Waste Minimization and Pollution Prevention	3	0	0	3	-	CGPA	Theory
36	Chemical	Sustainable Engineering	19CH627	Principles of the Circular Economy	3	0	0	3	-	CGPA	Theory
37	Chemical	Sustainable Engineering	19CH628	Safety Engineering and Risk Management	3	0	0	3	-	CGPA	Theory
38	Chemical	Sustainable Engineering	19CH629	Industrial Safety	3	0	0	3	-	CGPA	Theory
39	Chemical	Sustainable Engineering	19CH503	Energy Technology	3	0	0	3	-	CGPA	Theory
40	Civil	Environmental Sustainability	19CE548	Energy Efficient Buildings	3	0	0	3	-	CGPA	Theory
41	Civil	Environmental Sustainability	19CE538	Climate Change Adaptation and Mitigation	3	0	0	3	-	CGPA	Theory
42	Civil	Environmental Sustainability	19CE540	Environmental Health and Safety	3	0	0	3	-	CGPA	Theory
43	Civil	Environmental Sustainability	19CE549	Rainwater Harvesting	3	0	0	3	-	CGPA	Theory
44	Civil	Environmental Sustainability	19CE550	Smart Cities and Urban Analytics	3	0	0	3	-	CGPA	Theory
45	Civil	Environmental Sustainability	19CE551	Transport and Environment	3	0	0	3	-	CGPA	Theory
46	Civil	Environmental Sustainability	19CE552	Environment, Policy and Legislations	3	0	0	3	-	CGPA	Theory
47	CSE	Cyber Security	19CS417	Ethical Hacking Techniques	2	0	2	3	-	CGPA	TIP (6 Expts)
48	CSE	Cyber Security	19CS415	Cryptography	2	0	2	3	-	CGPA	TIP (6 Expts)

49	CSE	Cyber Security	19CS416	Cloud Security	2	0	2	3	-	CGPA	TIP (6 Expts)
50	CSE	Cyber Security	19CS418	Cyber Law and Compliance	3	0	0	3	-	CGPA	Theory
51	CSE	Cyber Security	19CS419	Digital Forensics and Digital Investigations	2	0	2	3	-	CGPA	TIP (6 Expts)
52	CSE	Cyber Security	19CS534	Prevention Methodology for Cybersecurity	2	0	2	3	-	CGPA	TIP (6 Expts)
53	CSE	Cyber Security	19CS535	Trusted Network Systems	3	0	0	3	-	CGPA	TIP (6 Expts)
54	CSE	Cyber Security	19CS537	Secure Software Engineering	2	0	2	3	-	CGPA	Theory
55	CSE	Cyber Security	19CS538	System Security	3	0	0	3	-	CGPA	TIP (6 Expts)
56	CSE	Cyber Security	19CS539	Hardware Security	3	0	0	3	-	CGPA	Theory
57	CSE	Cyber Security	19CS547	Fundamentals of Cryptocurrency	3	0	0	3	-	CGPA	Theory
58	CSE	Cyber Security	19CS545	Open Source Operating System	2	0	2	3	-	CGPA	Theory
59	CSE	Cyber Security	19CS556	Core Computing Concepts	2	0	2	3	-	CGPA	TIP (6 Expts)
60	CSE	Cyber Security	19CS558	Data Privacy and Protection	2	0	2	3	-	CGPA	TIP (6 Expts)
61	CSE	Cyber Security	19CS536	Firewalls and Intrusion Detection System	2	0	2	3	-	CGPA	TIP (6 Expts)
62	ECE	VLSI	19EC410	VLSI Design	3	0	2	4	19EC303 / EC1801 / EC2404	CGPA	TIP (6 Expts)
63	ECE	VLSI	19EC517	Low Power VLSI Design	3	0	0	3	19EC410 / EC1410	CGPA	Theory
64	ECE	VLSI	19EC522	Physical Design for VLSI	2	0	2	3	19EC410 / EC1410	CGPA	TIP (6 Expts)
65	ECE	VLSI	19EC519	Testing of VLSI Circuits	3	0	0	3	19EC410 / EC1410	CGPA	Theory
66	ECE	VLSI	19EC822	VLSI Technology	3	0	0	3	EC1410 / 19EC410	CGPA	Theory

67	ECE	VLSI	19EC526	Verilog HDL	2	0	2	3	19EC303 / EC1801 / EC2404	CGPA	TIP (6 Expts)
68	ECE	VLSI	19EC521	System Verilog for Design and Verification	2	0	2	3	19EC526 / EC1526 / 19EC516	CGPA	TIP (6 Expts)
69	ECE	Mechatronics – Industrial Automation	19EC531	PLC Programming	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
70	ECE	Mechatronics – Industrial Automation	19EC532	Smart Applications	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
71	ECE	Mechatronics – Industrial Automation	19EC533	Industrial Automation	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
72	ECE	Mechatronics – Industrial Automation	19EC534	IoT and Cloud Integration	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
73	ECE	Mechatronics – Industrial Automation	19EC535	Industry 4.0	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
74	ECE	Mechatronics – Industrial Automation	19EC536	Emerging Technologies for Smart Manufacturing and Industry 5.0	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
75	EEE	Electric Vehicle Technology	19EE526	Introduction to Fundamentals of Electric Vehicles	3	0	0	3	-	CGPA	Theory
76	EEE	Electric Vehicle Technology	19EE527	Electric Vehicle Powertrain and Integration	2	0	2	3	19EE526/EC 2526	CGPA	TIP (6 Expts)
77	EEE	Electric Vehicle Technology	19EE528	Electric Vehicle Charging Infrastructure	3	0	0	3	19EE526/EC 2526	CGPA	Theory
78	EEE	Electric Vehicle Technology	19EE529	Electric Vehicle Grid Integration	2	0	2	3	19EE526/EC 2526	CGPA	TIP (6 Expts)
79	EEE	Electric Vehicle Technology	19EE530	Embedded IoT for Electric Vehicles	2	0	2	3	EC2526	CGPA	TIP (6 Expts)
80	EEE	Electric Vehicle Technology	19EE531	Embedded AI for Electric Vehicles	2	0	2	3	19EE526/EC 2526	CGPA	TIP (6 Expts)
81	EEE	Electric Vehicle Technology	19EE532	Battery Technologies and Management Systems for Electric Vehicles	3	0	0	3	EC2526	CGPA	Theory
82	EEE	Automotive Embedded System	NA	Automotive MCAL and Driver Development	2	0	4	4	-	CGPA	TIP (10 Expts)
83	EEE	Automotive Embedded System	NA	Complex Device Driver Applications	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
84	EEE	Automotive Embedded System	NA	Automotive Communication Protocols	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10

85	EEE	Automotive Embedded System	NA	Automotive ECU Verification and Validation	2	0	4	4	-	CGPA	TIP (10 Expts)
86	EEE	Automotive Embedded System	NA	Version Control and Software Integration	2	0	4	4	-	CGPA	TIP (10 Expts)
87	IT	Full Stack Development	19AI414	Fundamentals of Web Application Development	3	0	4	5	-	CGPA	TIP (10 Expts)
88	IT	Full Stack Development	19CS548	Cloud Services Management	2	0	2	3	-	CGPA	TIP (6 Expts)
89	IT	Full Stack Development	19CS549	UI and UX Design	2	0	2	3	-	CGPA	TIP (6 Expts)
90	IT	Full Stack Development	19CS551	Software Testing and Automation	2	0	2	3	-	CGPA	TIP (6 Expts)
91	IT	Full Stack Development	19CS552	DevOps	2	0	2	3	-	CGPA	TIP (6 Expts)
92	IT	Full Stack Development	19CS567	Cloud Native App Development	2	0	2	3	-	CGPA	TIP (6 Expts)
93	IT	Full Stack Development	19CS553	Web Application Security	2	0	2	3	-	CGPA	TIP (6 Expts)
94	IT	Full Stack Development	19CS554	Stream Processing	2	0	2	3	-	CGPA	TIP (6 Expts)
95	IT	Full Stack Development	19CS404	Database Management System and its Applications	3	0	2	4	19AI301/19AI304/19CS301/19CS302/19	CGPA	TIP (6 Expts)
96	IT	Full Stack Development	19AI512	NoSQL Database Design	2	0	2	3	19CS301	CGPA	TIP (6 Expts)
97	IT	Full Stack Development	19CS408	Software Engineering	3	0	2	4	-	CGPA	TIP (6 Expts)
98	IT	Full Stack Development	19AI545	Modern Web Application Development	2	0	2	3	19CS410 / 19AI401 / 19AI414 /	CGPA	TIP (6 Expts)
99	IT	Full Stack Development	19AI552	Web Application User Interface Development	2	0	2	3	-	CGPA	TIP (6 Expts)
100	IT	Full Stack Development	19AI553	Advanced Java Web Applications	2	0	2	3	19AI307	CGPA	TIP (6 Expts)
101	IT	Full Stack Development	19AI546	Web Server Programming	2	0	2	3	19CS401	CGPA	TIP (6 Expts)
102	IT	Full Stack Development	19AI307	Object Oriented Programming using Java	1	0	4	3	19AI304 / CS3304	CGPA	TIP (6 Expts)

103	IT	Full Stack Development	19AI308	Object Oriented Programming using C#	2	0	2	3	19AI304	CGPA	TIP (6 Expts)
104	IT	Full Stack Development	19AI539	Mobile User Interface Development	2	0	2	3	19CS401	CGPA	TIP (6 Expts)
105	IT	Full Stack Development	19AI540	Programming Mobile Devices	2	0	2	3	19CS401	CGPA	TIP (6 Expts)
106	IT	Full Stack Development	19CS556	Core Computing Concepts	2	0	2	3	-	CGPA	TIP (6 Expts)
107	Mech	3D Printing Technology	19ME534	Fundamentals of 3D Printing Technologies	3	0	0	3	-	CGPA	Theory
108	Mech	3D Printing Technology	19ME535	Reverse Engineering and CAD Modelling	3	0	2	4	19ME534/ ME0534	CGPA	TIP (6 Expts)
109	Mech	3D Printing Technology	19ME536	Design for 3D Printing	3	0	2	4	19ME534, ME0534	CGPA	TIP (6 Expts)
110	Mech	3D Printing Technology	19ME537	3D Printing Machines and Systems	3	0	0	3	19ME534, ME0535	CGPA	Theory
111	Mech	3D Printing Technology	19ME538	Materials for 3D Printing	3	0	0	3	19ME534, ME0534	CGPA	Theory
112	Mech	3D Printing Technology	19ME539	3D Printing for Medical Applications	3	0	2	4	19ME534, ME0534	CGPA	TIP (6 Expts)
113	Mech	Mechatronics – Industrial Automation	19ME574	PLC Programming	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
114	Mech	Mechatronics – Industrial Automation	19ME575	Smart Applications	1	0	4	3	-	CGPA	Theory (Int Only) and
115	Mech	Mechatronics – Industrial Automation	19ME576	Industrial Automation	1	0	4	3	-	CGPA	Theory (Int Only) and
116	Mech	Mechatronics – Industrial Automation	19ME577	IoT and Cloud Integration	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
117	Mech	Mechatronics – Industrial Automation	19ME578	Industry 4.0	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10 Expts)
118	Mech	Mechatronics – Industrial Automation	19ME579	Emerging Technologies for Smart Manufacturing and Industry 5.0	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
119	EEE	Automotive Embedded Systems	NA	Automotive MCAL and Driver Development	2	0	4	4	-	CGPA	TIP (10 Expts)
120	EEE	Automotive Embedded Systems	NA	Complex Device Driver Applications	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10
121	EEE	Automotive Embedded Systems	NA	Automotive Communication Protocols	1	0	4	3	-	CGPA	Theory (Int Only) and Practical (10

122	EEE	Automotive Embedded Systems	NA	Automotive ECU Verification and Validation	2	0	4	4	-	CGPA	TIP (10 Expts)
123	EEE	Automotive Embedded Systems	NA	Version Control and Software Integration	2	0	4	4	-	CGPA	TIP (10 Expts)
124	AI&DS	Quantum Computing	NA	Foundations of Quantum Computing: Physics, Engineering, and Mathematics Computing	3	0	0	3	-	CGPA	Theory
125	AI&DS	Quantum Computing	NA	Survey of Quantum Technologies and Applications	3	0	0	3	-	CGPA	Theory
126	AI&DS	Quantum Computing	NA	Foundations of Quantum Technologies	3	0	0	3	-	CGPA	Theory
127	AI&DS	Quantum Computing	NA	Basic Programming Lab	2	0	2	3	-	CGPA	TIP (6 Expts)
128	AI&DS	Quantum Computing	NA	Basic Laboratory Course for Quantum Technologies	2	0	2	3	-	CGPA	TIP (6 Expts)
129	AI&DS	Quantum Computing	NA	Introduction to Quantum Computation	3	0	0	3	-	CGPA	Theory
130	AI&DS	Quantum Computing	NA	Introduction to Quantum Communication	3	0	0	3	-	CGPA	Theory
131	AI&DS	Quantum Computing	NA	Introduction to Quantum Sensing	3	0	0	3	-	CGPA	Theory
132	AI&DS	Quantum Computing	NA	Introduction to Quantum Materials	3	0	0	3	-	CGPA	Theory
133	AI&DS	Quantum Computing	NA	Engineering Foundations of Quantum Technologies	3	0	0	3	-	CGPA	Theory
134	AI&DS	Quantum Computing	NA	Solid State Physics for Quantum Technologies	3	0	0	3	-	CGPA	Theory
135	AI&DS	Quantum Computing	NA	Quantum Optics	3	0	0	3	-	CGPA	Theory