

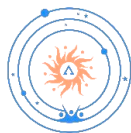
PROGRAM CURRICULUM

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

for

B. TECH. FOUR YEAR DEGREE PROGRAM

(Applicable for the batches admitted from A.Y 2024-25)



ADITYA UNIVERSITY

Aditya Nagar, ADB Road, Surampalem - 533 437



ADITYA UNIVERSITY

B.Tech. in Department of Artificial Intelligence and Machine Learning

VISION

To be a leading hub in Artificial Intelligence through excellence in education, innovation, and sustainable practices.

MISSION

M1: Deliver cutting-edge AI education with advanced tools, techniques, and industry collaboration to address global challenges.

M2: Nurture creativity, research, and lifelong learning for personal and professional excellence.

M3: Promote ethical leadership and sustainability to build a responsible AI ecosystem.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Apply emerging tools and technologies to solve interdisciplinary problems.

PEO2: Advance in education and research by applying innovative ideas and project-based learning.

PEO3: Work collaboratively and establish leadership with ethical, social, and financial accountability.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Apply core engineering, computing principles, AI and programming skills to develop efficient software solutions.

PSO2: Utilize emerging technologies to solve real-world challenges in industry and society with innovation and responsibility.

PROGRAM OUTCOMES (PO's)

The 11 Program Outcomes are described as below.

After successful completion of the program, the graduates will be able to

- PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
- PO4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
- PO5 **Engineering tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
- PO6 **The Engineer and the world :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- PO7 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- PO8 **Individual and collaborative teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- PO9 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO10 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO11 **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Artificial Intelligence and Machine Learning

B.Tech (AIML) Program Curriculum-2024 (Applicable for the batches admitted from the A.Y.2024-25)

UG Programs Offered

- B. Tech in (Artificial Intelligence and Machine Learning)
- B. Tech in (Artificial Intelligence and Machine Learning) with
 - Minor degree in Civil Engineering.
 - Minor degree in Electrical and Electronics Engineering
 - Minor degree in Mechanical Engineering
 - Minor degree in Electronics and Communication Engineering
 - Minor degree in Petroleum Technology
 - Minor degree in Mining Engineering
 - Minor degree in Agricultural Engineering
 - Minor degree in Entrepreneurship Development and Incubation
 - Minor degree in Quantum Technologies

Minor Streams offered in B.Tech (Artificial Intelligence and Machine Learning)

- Minor Stream in Network Security
- Minor Stream in Cognitive Analytics
- Minor Stream in Mobile Application Development
- Minor Stream in Cyber Security Industry Integrated Program-L & T
- Minor Stream in Agile Methodology with DevOps Programming Industry Integrated Program-L & T
- Minor Stream in Cloud Infrastructure (Certification Programs - CISCO, Redhat, Oracle, AWS, Google & Microsoft)

Credit Division Category-wise

S.No	Broad Category of Course	UGC	Credits
1	Major Core Courses (MCC)	80	81
2	Minor Stream Courses (MSC) (or) University Open Elective Courses (UEC)	32	32
3	Multidisciplinary Courses (MDC)	9	9
4	Ability Enhancement Courses (AEC)	8	9
5	Skill Enhancement Courses (SEC)	9	9
6	Value Added Courses (VAC)	6-8	6
7	Summer Internships (SI)	2-4	4
8	Full Semester Internship (or) Project (PROJ)	12	10
9	Mandatory Courses (MC)		0
Total Credits to be earned for B.Tech Degree		160	160

Foundation Courses – FC

Intermediate-level Courses - IC

Advanced Courses – AC

Major Core Courses (MCC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MA001	Linear Algebra & Calculus	FC	2	1		3	50	50	100	-
241MA002	Differential Equations & Vector Calculus	FC	2	1		3	50	50	100	-
241CH002	Applied Chemistry	FC	2		1	3	50	50	100	-
241PH002	Modern Physics	FC	2		1	3	50	50	100	-
241ME001	Engineering Graphics	FC	1		2	3	50	50	100	-
241ME003	Engineering Workshop	FC			1	1	100	-	100	-
241CS001	Programming for Problem Solving using C	FC	2		2	4	50	50	100	-
241CS003	Data Structures	FC	2		2	4	50	50	100	PPSC
241IT001	IT & AI Skills	FC			2	2	50	50	100	-
241MA008	Discrete Mathematics	IC	2	1		3	50	50	100	LAC
241MA009	Probability & Statistics	IC	2	1		3	50	50	100	LAC
241AI002	Artificial Intelligence	IC	2		1	3	50	50	100	-
241IT005	Database Management Systems	IC	2		2	4	50	50	100	PPSC
241AI003	Data Mining	IC	2		1	3	50	50	100	-
241IT006	Java Programming	IC	2		2	4	50	50	100	PPSC
241CS009	Language Processors	IC	2	1		3	50	50	100	PPSC
241IT007	Agile Software Engineering	IC	2		1	3	50	50	100	PPSC
241CS013	Operating Systems	IC	2		1	3	50	50	100	-
241CS007	Computer Networks	IC	2		1	3	50	50	100	-
241AI005	Machine Learning	IC	2		2	4	50	50	100	DAP
241CS010	Advanced Data Structures & Algorithm Analysis	AC	2		1	3	50	50	100	DS
241AI011	Deep Learning	AC	2		2	4	50	50	100	DAP
241AI020	Natural Language Processing & Prompt Engineering	AC	2		1	3	50	50	100	DAP
241AI021	Reinforcement Learning & Gen AI	AC	2		1	3	50	50	100	DAP
241AI004	Big Data Analytics	AC	2		1	3	50	50	100	DM
241IT003	Cryptography & Network Security	AC	2		1	3	50	50	100	CN
Total			47	5	29	81				

Multidisciplinary Courses (MDC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EE001	Basic Electrical & Electronics Engineering	FC	2		2	4	50	50	100	-
241AI006	Digital Logic & Computer Organization	FC	2	1		3	50	50	100	-
241MB001	Engineering Economics & Management	FC	2			2	50	50	100	-
Total			6	1	2	9				

Ability Enhancement Courses (AEC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EN001	Essential Cognitive Skills for Engineers	FC			1	1	100	-	100	-
241EN002	Advanced Cognitive Skills for Engineers (or)	FC								
241UC005	Proficiency in Foreign Language (Japanese/ German/ French/ Spanish)		1	1	100	-	100	-		
241UC004										
241UC003										
241UC006										
241UC007	Design Thinking	FC			1	1	100	-	100	-
241UC008	Universal Human Values	FC	2			2	100	-	100	-
241UC009	Technical Paper Publication	AC			2	2	100	-	100	-
241AI035	Student Activity-Based Learning	AC				2				
Total			2		5	9				

Skill Enhancement Courses (SEC)

Course Code	Course Name	Level	L	T	P	C	CI E	SE E	Tota l	Pre-requisit e
241AI033	Programming with C++	IC			2	2	50	50	100	-
241CS017	Object Oriented Analysis & Design using UML	IC			2	2	50	50	100	ASE
241AI034	Web Application Development using MERN Stack	AC			2	2	50	50	100	-
241IT008	Bigdata Spark	AC			2	2	50	50	100	-
241CS019	CI/CD using DevOps	AC			1	1	100	-	100	-
Total					9	9				

Value Added Courses (VAC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241UC010	Indian Cultural Heritage & Fine Arts	FC			1	1	100	-	100	-
241PE001	Sports & Yoga	FC			1	1	100	-	100	-
241CS004	Internet of Things	FC			1	1	100	-	100	-
241CS002	Data Analysis Using Python	IC			2	2	50	50	100	-
241UC011	Employability Skills-I	FC			3	0	100	-	100	-
241UC013	Employability Skills-II	FC			3	0	100	-	100	ES-I
241UC014	Employability Skills-III	IC			3	0	100	-	100	ES-II
241UC015	Employability Skills-IV	IC			3	0	100	-	100	ES-III
241UC016	Employability Skills-V	AC			3	1	100	-	100	ES-IV
Total						20	6			

Summer Internships (SI)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AI022	Summer Internship-I	IC			2	2	100	-	100	-
241AI023	Summer Internship-II	AC			2	2	100	-	100	-
Total						4	4			

Full Semester Internship (PROJ)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AI025	Full Semester Internship (or) Project (PROJ)	AC			10	10	50	50	100	-
Total						10	10			

Mandatory Courses (MC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AC001	Environmental Science	FC	2			0	100	-	100	-
241AC002	Constitution of India	FC	2			0	100	-	100	-
241AC003	Research Methodology	FC	2			0	100	-	100	-
241AC004	Intellectual Property Rights & Patents	FC	2			0	100	-	100	-
241AC005	Indian Knowledge Systems (IKS)	FC	2			0	100	-	100	-
Total			10			0				

Minor Stream: Network Security

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS032	Cyber Security Essentials	FC	2		1	3	50	50	100	-
241CS030	Information Security Analysis & Audit	FC	2			2	50	50	100	-
241CS023	Cloud Computing	FC	2		2	4	50	50	100	-
241CS024	Wireless Networks	IC	2		1	3	50	50	100	-
241CS025	Cloud IoT & Edge ML	AC	2		1	3	50	50	100	-
241CS028	Ethical Hacking	AC	2		2	4	50	50	100	-
241CS027	Digital Forensics	AC	2		1	3	50	50	100	-
241CS026	Block Chain Technologies	AC	2		2	4	50	50	100	-
241CS031	Cyber Laws	AC	2		1	3	50	50	100	CSE
241CS033	Secure Coding Techniques	AC	2		1	3	50	50	100	-
Total			20		12	32				

Minor Stream: Cognitive Analytics

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS034	Fundamentals of Data Science	IC	2		1	3	50	50	100	-
241AI026	Information Retrieval Systems	IC	2		1	3	50	50	100	-
241AI014	Soft Computing	IC	2		1	3	50	50	100	AI
241AI007	Computer Vision	IC	2		1	3	50	50	100	DAP
241AI024	API & Micro Services	IC	2		2	4	50	50	100	JP
241AI015	AI Chatbots	IC	2			2	50	50	100	AI
241AI019	Data Visualization	AC	2		2	4	50	50	100	DAP
241CS006	Mobile & IoT Analytics	AC	2		1	3	50	50	100	-
241AI013	Recommender Systems	AC	2		2	4	50	50	100	-
241AI008	Expert Systems	AC	2		1	3	50	50	100	-
Total			20		12	32				

Minor Stream: Mobile Application Development

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241IT012	Flutter Fundamentals	FC			2	2	50	50	100	-
241IT014	Web Technologies	FC	2		2	4	50	50	100	JP
241IT015	Software Testing	IC	2		1	3	50	50	100	ASE
241IT016	Software Project Management	IC	2		1	3	50	50	100	ASE
241IT017	Mobile Operating System	IC	2		1	3	50	50	100	-
241CS024	Wireless Networks	IC	2		1	3	50	50	100	-
241AI024	API & Micro Services	IC	2		2	4	50	50	100	JP
241CS025	Cloud IoT & Edge ML	AC	2		1	3	50	50	100	-
241CS028	Ethical Hacking	AC	2		2	4	50	50	100	-
241IT022	Software Quality Assurance	AC	2		1	3	50	50	100	ASE
Total			18		14	32				

Minor Stream: Cyber Security Industry Integrated Program-L & T[#]

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS032	Cyber Security Essentials	FC	2		1	3	50	50	100	-
241CS030	Information Security Analysis & Audit	FC	2			2	50	50	100	-
241CS042	Linux Administration	IC			3	3	50	50	100	-
241IT003	Cryptography & Network Security	AC	2		1	3	50	50	100	-
241CS043	Secure Networking	AC			3	3	50	50	100	-
241CS044	Application Security	AC			3	3	50	50	100	-
241CS045	Ethical Hacking & Penetration Testing	AC			3	3	50	50	100	-
241CS046	Cyber Forensic	AC			3	3	50	50	100	-
241CS047	Malware Analysis & Governance, Risk & Compliance	AC			3	3	50	50	100	-
241CS031	Cyber Laws	AC	2		1	3	50	50	100	-
241CS033	Secure Coding Techniques	AC	2		1	3	50	50	100	-
Total			10		22	32				

**Minor Stream: Agile Methodology with DevOps Programming Industry
Integrated Program - L & T#**

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS048	IT Infrastructure Management	FC			3	3	50	50	100	-
241CS049	Web Engineering	FC			2	2	50	50	100	-
241CS050	Intro to Azure & AWS DevOps	FC			3	3	50	50	100	-
241CS051	Intro to Google Cloud DevOps	FC			3	3	50	50	100	-
241CS052	Cloud fundamentals & DevOps	IC			3	3	50	50	100	-
241CS053	Agile with DevOps Fundamentals & Usage	IC			3	3	50	50	100	-
241IT016	Software Project Management	IC	2		1	3	50	50	100	ASE
241CS054	Agile based project automation with DevOps	AC			3	3	50	50	100	-
241CS055	DevOps Container Services	AC			3	3	50	50	100	-
241CS056	CI & CD (Continuous Integration & Continuous Development)	AC			3	3	50	50	100	-
241CS057	Object Oriented Software Engineering	AC			3	3	50	50	100	-
Total			2		30	32				

Note: #-The Syllabus for the Industry Partnered Courses will be released in the department as and when required

Minor Stream: Cloud Infrastructure (Certification Programs - CISCO, Red hat, Oracle, AWS, Google & Microsoft)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS068	Enterprise Linux Fundamentals	FC			2	2	50	50	100	-
241CS058	Linux System Administration	FC			3	3	50	50	100	-
241CS059	Introduction to Cloud Networking	FC	1		3	4	50	50	100	-
241CS060	Routing & Switching Essentials	FC			3	3	50	50	100	-
241CS061	Advanced Cloud Networking	FC	1		3	4	50	50	100	-
241CS074	Introduction to Cloud Computing Core Concepts	IC			3	3	50	50	100	-
241CS062	Cloud Architecture & Platform Services	IC			3	3	50	50	100	-
241CS063	Enterprise Cloud Infrastructure	IC			3	3	50	50	100	-
241CS069	Cloud Security	IC	1		3	4	50	50	100	-
241CS064	Machine Learning Services on Cloud	IC			3	3	50	50	100	-
Total			3		29	32				

University Open Elective Courses

AI & ML											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241AI002	Artificial Intelligence	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241AI005	Machine Learning	FC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI027	AI & Data Science	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI028	AI in Healthcare	IC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
241AI011	Deep Learning	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI010	Natural Language Processing	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI009	Reinforcement Learning	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI029	AI in Agriculture	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
241AI030	Robotics & AI	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
241AI031	AI in Finance & Economics	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
Total			20		12	32					

Production Excellence

Course Code	Course Name	Level	L	T	P	C	CE	SE	Total	Offered to Programs	Pre-requisite
241ME081	Fundamentals of Production Excellence	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME082	Six Sigma for Production Excellence	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME083	Quality Excellence in Production	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME084	Digital Transformation for Production Excellence	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME085	Agile Production Systems	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME086	Process Excellence & Optimization	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME087	Risk Management in Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME088	Ethical & Social Responsibility in Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME089	Data-Driven Decision Making for Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME058	Industry 5.0 for Engineers	AC	3			3	50	50	100	CE,EEE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME090	Cost Excellence in Production	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
Total			23		9	32					

Supply Chain Management

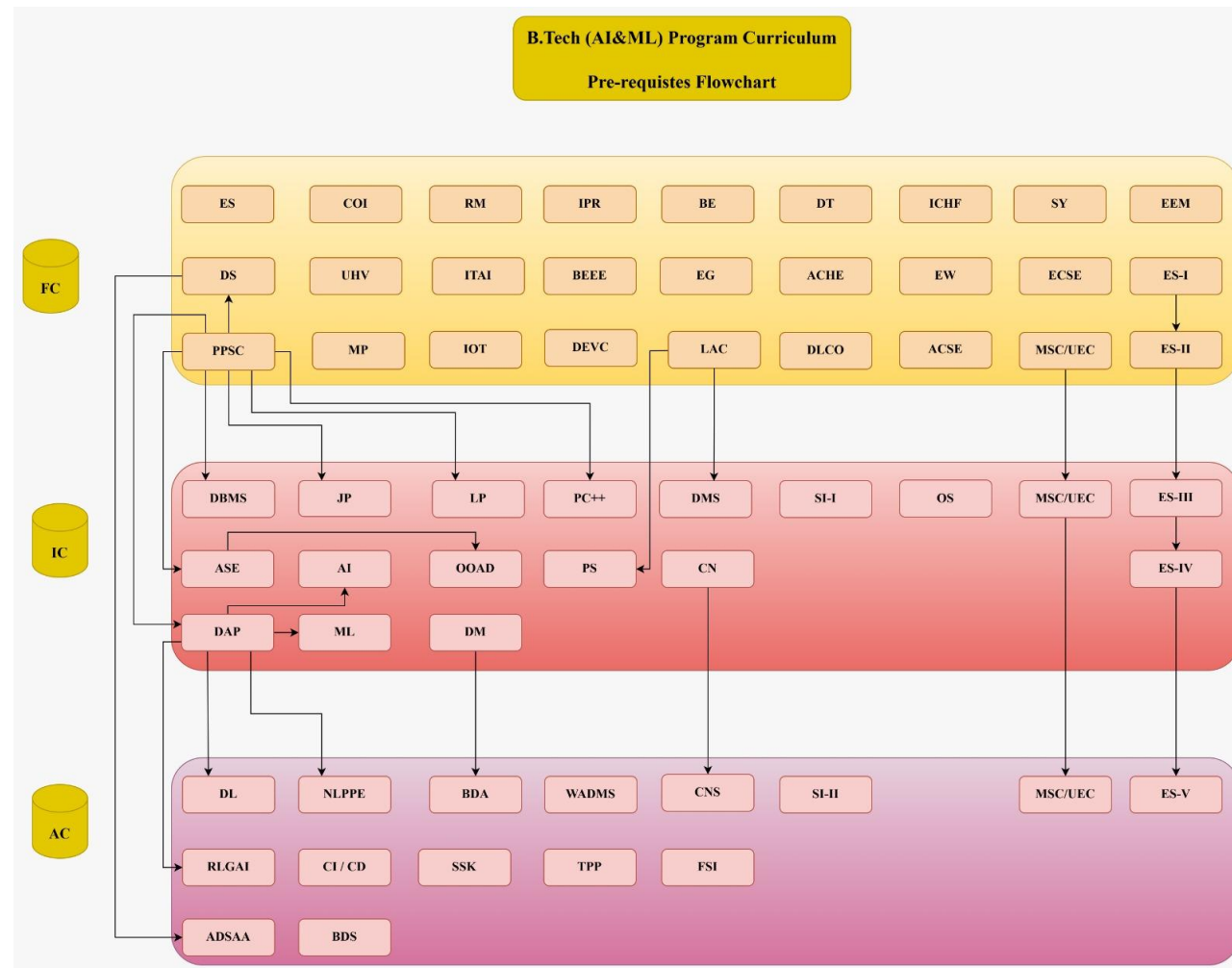
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241MB017	Introduction to Supply Chain Management	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241MB018	Logistics & Distribution Management	FC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB019	Supply Chain Project Management	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB020	Supply Chain Innovation & Trends	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB021	Supply Chain Analytics	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB022	Demand Planning & Forecasting	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB023	Supply Chain Risk Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB024	Inventory Management & Control	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB025	E-Commerce & Supply Chain Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB026	Operations Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB027	Supply Chain Ethics & Corporate Social Responsibility (CSR)	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
Total			32			32					

Sustainability											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241CE074	Introduction to Sustainable Development	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE079	Natural Disaster Management & Mitigation	FC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE081	Waste Water Management	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE082	Integrated Solid Waste Management for a Smart City	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE083	Watershed Management	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EE033	Energy Audit, Conservation & Management	IC	3			3	50	50	100	CE, ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EE006	Electric Power Generation, Transmission & Distribution Systems	AC	3			3	50	50	100	CE, ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241CE075	Sustainable Agriculture & Food Systems	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE076	Sustainable Supply Chain Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE077	Sustainable Production Excellence	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE078	AI in Environmental Science and Sustainability	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
Total			32			32					

Security											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241CS032	Cybersecurity Essentials	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT035	Security in Software Development	FC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS028	Ethical Hacking	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS069	Cloud Security	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT036	Security & Compliance in Business	IC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT037	Cryptography & Data Security	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT038	Security Awareness & Social Engineering	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT039	Cybersecurity Policy & Strategy	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT040	Security in Emerging Technologies	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS030	Information Security Analysis & Audit	AC	2			2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT041	Financial Information Security & Privacy	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
Total			25		7	32					

Others											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241CE080	Remote Sensing & GIS Applications	FC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EE036	Electric Energy Storage Systems	FC	3			3	50	50	100	CE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EE043	Electrical safety	IC	3			3	50	50	100	CE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EE054	Hybrid & Electric Vehicles	IC	3			3	50	50	100	CE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241ME073	Organizational Behaviour	FC	3			3	50	50	100	CE,EEE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME036	Sustainable Energy Systems	FC	3			3	50	50	100	CE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME037	Solar Energy Systems	FC	3			3	50	50	100	CE,EEE,ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME060	Composite Materials	IC	3			3	50	50	100	CE,EEE,ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	SSP/MP
241EC082	Communication Systems	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC083	Electronic Measurements & Instrumentation	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EC084	Introduction to Embedded Systems	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC085	Fundamentals of Image Processing	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC077	Sensors and Transducers	IC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CS003	Data Structures	FC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS065	Computer Organization	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS013	Operating Systems	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-

241IT005	Database Management Systems	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241IT007	Agile Software Engineering	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS007	Computer Networks	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT006	Java Programming	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS068	Fundamentals of RedHat Enterprise Linux	FC			2	2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS067	AWS Cloud Foundations	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS066	AWS Cloud Development	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS070	Continuous integration & delivery using DevOps	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT024	Fundamentals of Salesforce Administration	FC			2	2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT034	Advanced Salesforce Administration	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT023	Principles of Pega Systems	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT026	Pega System Architecture & Design	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241MB004	Entrepreneurship Development & Incubation	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241MB005	Business Ethics & Corporate Governance	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241MB006	Entrepreneurship Development & Business Management	AC	1		2	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC029	SoC Design	AC	3			3	50	50	100	CE, EEE, ME, CSE, IT, AIML, CSE (DS), PT, Min.E.	MPMC
241CS023	Cloud Computing	FC	2		2	4	50	50	100	CE, EEE, ME, ECE, PT, Min.E.	-



FC-Foundation Courses

ES-Environmental Science
CI-Constitution of India
RM-Research Methodology
IPR- Intellectual Property Rights & Patents
BE- Biology for Engineers
DT- Design Thinking
ICHFA- Indian Cultural Heritage & Fine Arts
SY- Sports & Yoga
EEM- Engineering Economics & Management
MP- Modern Physics
UHV- Universal Human Values
ITAI- IT & AI Skills
BEEE- Basic Electrical & Electronics Engineering
EG- Engineering Graphics
ACHE- Applied Chemistry
EW- Engineering Workshop
ECSE- Essential Cognitive Skills for Engineers
ACSE- Advanced Cognitive Skills for Engineers (or) Proficiency in Foreign Language (Japanese/German/ Spanish /French)
DS- Data Structures
PPSC- Programming for Problem Solving Using C
IoT- Internet of Things
LAC- Linear Algebra & Calculus
DEVC- Differential Equations & Vector Calculus
DLCO- Digital Logic & Computer Organization
ES-I- Employability Skills-I
ES-II-Employability Skills-II

IC-Intermediate-Level Courses

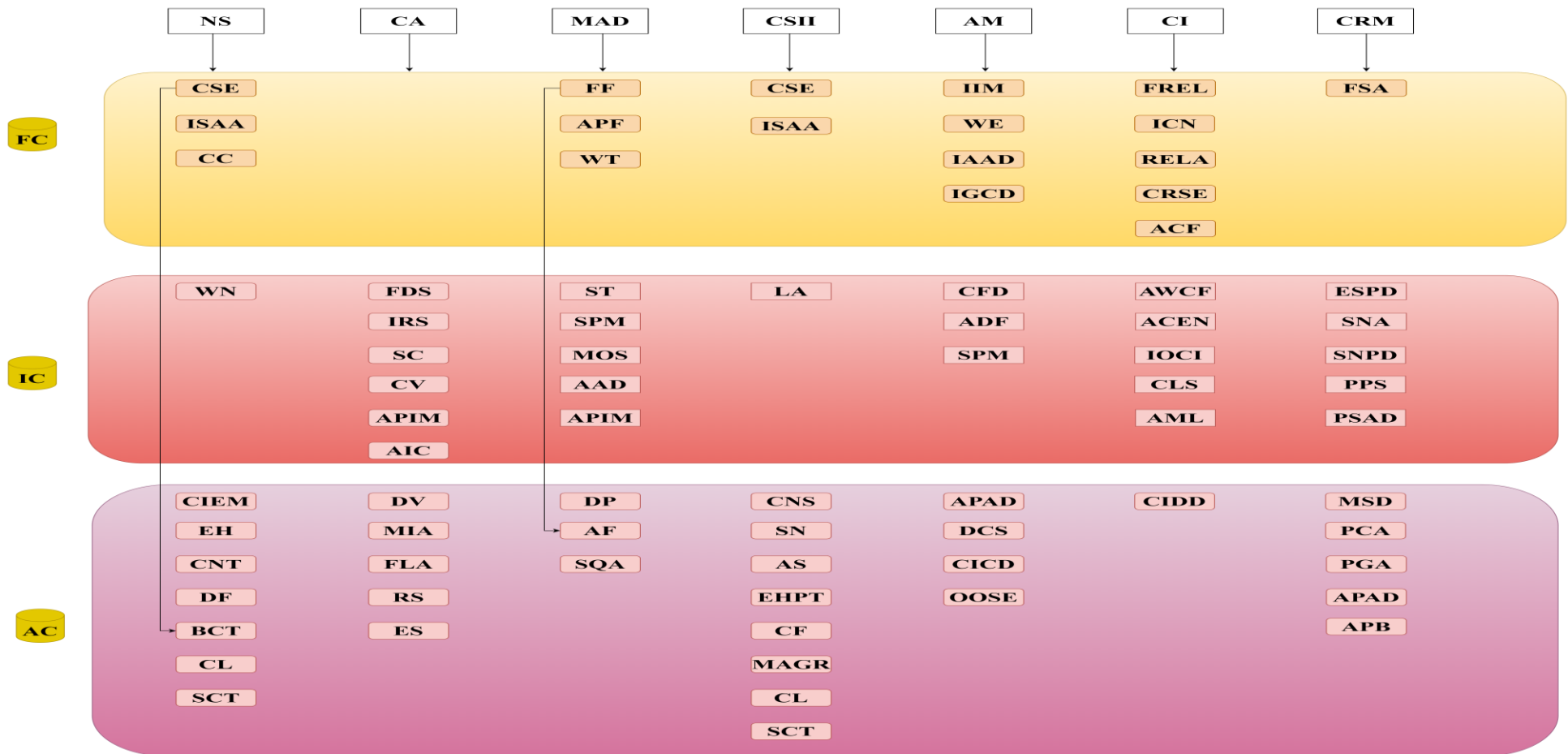
DBMS- Database Management Systems
JP- Java Programming
LP- Language Processors
ASE- Agile Software Engineering
DMS- Discrete Mathematics
PS- Probability & Statistics
OS- Operating Systems
DM- Data Mining
DAP- Data Analysis Using Python
AI- Artificial Intelligence
ML- Machine Learning
OOAD- Object Oriented Analysis & Design using UML
CN- Computer Networks
PC++- Programming with C++
SI-I- Summer Internship – I
ES-III- Employability Skills-III
ES-IV-Employability Skills-IV

AC-Advanced Courses

BDA- Big Data Analytics
BDS- Bigdata Spark
NLPPE- Natural Language Processing & Prompt Engineering
RLGAI- Reinforcement Learning & Gen AI
DL- Deep Learning
WADMS- Web Application Development using MERN Stack
CNS- Cryptography & Network Security
SI-II- Summer Internship – II
ADSAA- Advanced Data Structures & Algorithm Analysis
CI/CD- CI/CD using DevOps
SSK- Soft Skills
TPP- Technical Paper Publication
FSI- Full Semester Internship
ES-V-Employability Skills-V

MSC/UEC- Minor Stream Courses / University Open Elective Courses

**B.Tech (AI&ML) Minor Stream
Pre-requisite flowchart**



<u>Minor Streams</u>	<u>FC-Foundation Courses</u>	<u>IC-Intermediate-Level Courses</u>	<u>AC-Advanced Courses</u>
NS: Network Security	ISAA: Information Security Analysis & Audit CC: Cloud Computing Principles CSE: Cyber Security Essentials	WN: Wireless Networks	CIEM: Cloud IoT & Edge ML CL: Cyber Laws BCT: Block Chain Technologies DF: Digital Forensics SCT: Secure Coding Techniques EH: Ethical Hacking CNT: Computational Number Theory
CA: Cognitive Analytics		FDS: Fundamentals of Data Science IRS: Information Retrieval Systems SC: Soft Computing CV: Computer Vision APIM: API & Micro Services AIC: AI Chatbots	DV: Data Visualization MIA: Mobile & IoT Analytics FLA: Fuzzy Logic & its Applications RS: Recommender Systems ES: Expert Systems
MAD: Mobile Application Development	FF: Flutter Fundamentals APF: Adobe Photoshop & Figma WT: Web Technologies	ST: Software Testing SPM: Software Project management MOS: Mobile Operating System AAD: Android Application Development APIM: API & Micro Services	DP: Dart Programming AF: Advanced Flutter SQA: Software Quality Assurance
CSII: Cyber Security Industry Integrated Program-L & T	CSE: Cyber Security Essentials ISAA: Information Security Analysis & Audit	LA: Linux Administration	CNS: Cryptography & Network Security SN: Secure Networking AS: Application Security EHPT: Ethical Hacking & Penetration Testing CF: Cyber Forensic MAGR: Malware Analysis & Governance, Risk & Compliance CL: Cyber Laws SCT: Secure Coding Techniques
AM: Agile Methodology with DevOps Programming Industry Integrated -L & T	IIM: IT Infrastructure Management WE: Web Engineering IAAD: Intro to Azure & AWS DevOps IGCD: Intro to Google Cloud DevOps	CFD: Cloud Fundamentals & DevOps ADF: Agile with DevOps Fundamentals & Usage SPM: Software Project management	APAD: Agile based Project Automation with DevOps DCS: DevOps Container Services CICD: CI & CD (Continuous Integration & Continuous Development) OOSE: Object Oriented Software Engineering

CI: Cloud Infrastructure	FREL: Enterprise Linux Fundamentals ICN: Introduction to Cloud Networks RELA: Linux System Administration CRSE: Routing & Switching Essentials ACF: Cloud Architecture & Platform Services	AWCF: Cloud Computing Foundations ACEN: Advanced Cloud Networking IOCI: Enterprise Cloud Infrastructure CLS: Cloud security AML: Machine learning Services on Cloud	CIDD: Continuous Integration & Deployment DevOps
CRM: Customer Relationship Management	FSA: Fundamentals of Salesforce Administration	ESPD: Essentials of Salesforce Platform Development PSAD: Pega System Architecture & Design SNA: Service Now Administration SNPD: Service Now Platform Development PPS: Principles of Pega Systems	MSD: Mastering Salesforce Development APAD: Advanced Power APPS Development APB: Advanced Power BI PCA: Pega CSA Advanced PGA: PEGA GenAI

Suggestive Semester-wise Curriculum I SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA001	Linear Algebra & Calculus	MCC	FC	2	1		3	3
241CH002	Applied Chemistry	MCC	FC	2		1	3	4
241CS001	Programming for Problem Solving Using C	MCC	FC	2		2	4	6
241IT001	IT & AI Skills	MCC	FC			2	2	4
241ME001	Engineering Graphics	MCC	FC	1		2	3	5
241ME003	Engineering Workshop	MCC	FC			1	1	2
241EN001	Essential Cognitive Skills for Engineers	AEC	FC			1	1	2
241UC008	Universal Human Values	AEC	FC	2			2	2
241UC010	Indian Cultural Heritage & Fine Arts	VAC	FC			1	1	2
Total				9	1	10	20	30

II SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA002	Differential Equations & Vector Calculus	MCC	FC	2	1		3	3
241PH002	Modern Physics	MCC	FC	2		1	3	4
241CS003	Data Structures	MCC	FC	2		2	4	6
241EE001	Basic Electrical & Electronics Engineering	MDC	FC	2		2	4	6
241AI006	Digital Logic & Computer Organization	MDC	FC	2	1		3	3
241EN002	Advanced Cognitive Skills for Engineers (or) Proficiency in Foreign Language (Japanese/German/French/ Spanish)	AEC	FC			1	1	2
241UC005								
241UC004								
241UC003								
241UC006								
241UC007	Design Thinking	AEC	FC			1	1	2
241PE001	Sports & Yoga	VAC	FC			1	1	2
241UC011	Employability Skills-I	VAC	FC			3	0	6
241AC001	Environmental Science	MC	FC	2			0	2
Total				12	2	11	20	36

III SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA009	Probability & Statistics	MCC	IC	2	1		3	3
241CS013	Operating Systems	MCC	IC	2		1	3	4
241AI002	Artificial Intelligence	MCC	IC	2		1	3	4
241IT005	Database Management Systems	MCC	IC	2		2	4	6
241IT007	Agile Software Engineering	MCC	IC	2		1	3	4
241AI033	Programming with C++	SEC	IC			2	2	4
241CS002	Data Analysis Using Python	VAC	IC			2	2	4
241UC013	Employability Skills-II	VAC	FC			3	0	6
241AC002	Constitution of India	MC	FC	2			0	2
Total				12	1	13	20	37

IV SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA008	Discrete Mathematics	MCC	IC	2	1		3	3
241AI003	Data Mining	MCC	IC	2		1	3	5
241IT006	Java Programming	MCC	IC	2		2	4	6
241CS010	Advanced Data Structures & Algorithm Analysis	MCC	AC	2		1	3	4
-	Minor Stream Course-1/ University Open Elective Course-1	MSC/ UEC	FC/IC/ AC	2			2	2
-	Minor Stream Course-2/ University Open Elective Course-2	MSC/ UEC	FC/IC/ DAC	2		1	3	4
241AI034	Web Application Development using MERN Stack	SEC	AC			2	2	4
241UC014	Employability Skills-III	VAC	FC			3	0	6
241AC003	Research Methodology	MC	FC	2			0	2
Total				14	1	10	20	36

V SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241CS007	Computer Networks	MCC	IC	2		1	3	4
241AI005	Machine Learning	MCC	IC	2		2	4	6
-	Minor Stream Course-3/ University Open Elective Course-3	MSC/ UEC	FC/IC/ AC	2		2	4	4
-	Minor Stream Course-4/ University Open Elective Course-4	MSC/ UEC	FC/IC/ AC	2		2	4	4
-	Minor Stream Course-5/ University Open Elective Course-5	MSC/ UEC	FC/IC/ DAC	2		1	3	4
241MB001	Engineering Economics & Management	MDC	FC	2			2	2
241CS017	Object Oriented Analysis & Design using UML	SEC	IC			2	2	4
241UC015	Employability Skills-IV	VAC	FC			3	0	6
241AI022	Summer Internship-I	SI	IC			2	2	4
241AC004	Intellectual Property Rights & Patents	MC	FC	2			0	2
Total				14		15	24	40

VI SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241AI011	Deep Learning	MCC	AC	2		2	4	6
241AI020	Natural Language Processing & Prompt Engineering	MCC	AC	2		1	3	4
241CS009	Language Processors	MCC	IC	2	1		3	3
-	Minor Stream Course-6/ University Open Elective Course-6	MSC/ UEC	FC/IC/ AC	2		1	3	4
-	Minor Stream Course-7/ University Open Elective Course-7	MSC/ UEC	FC/IC/ AC	2		1	3	4
-	Minor Stream Course-8/ University Open Elective Course-8	MSC/ UEC	FC/IC/ AC	2		2	4	4
241CS019	CI/CD using DevOps	SEC	AC			1	1	2
241CS004	Internet of Things	VAC	FC			1	1	2
241AC005	Indian Knowledge Systems (IKS)	MC	FC	2			0	2
Total				14	1	9	22	31

VII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241AI021	Reinforcement Learning & Gen AI	MCC	AC	2		1	3	4
241IT003	Cryptography & Network Security	MCC	AC	2		1	3	4
241AI004	Big Data Analytics	MCC	AC	2		1	3	4
-	Minor Stream Course-9/ University Open Elective Course-9	MSC/UEC	FC/IC/AC	2		1	3	4
-	Minor Stream Course-10/ University Open Elective Course-10	MSC/UEC	FC/IC/AC	2		1	3	4
241IT008	Bigdata Spark	SEC	AC			2	2	4
241AI023	Summer Internship-II	SI	AC			2	2	4
Total				10		9	19	28

VIII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241UC009	Technical Paper Publication	AEC	AC			2	2	4
241UC016	Employability Skills-V	VAC	FC			3	1	6
241AI035	Student Activity-Based Learning	VAC	AC				2	
241AI025	Full Semester Internship (or) Project (PROJ)	PROJ	AC			10	10	20
Total						15	15	30

Total Credit: 160.

* To acquire a minor degree, a student has to earn 20 credits in addition to the 160 credits.

Minor Degree in Artificial Intelligence and Machine Learning (offered to other branches students)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AI002	Artificial Intelligence	IC	2		1	3	50	50	100	-
241AI005	Machine Learning	IC	2		2	4	50	50	100	DAP
241AI015	AI Chatbots	IC	2			2	50	50	100	AI
241AI014	Soft Computing (or)	IC	2		1	3	50	50	100	AI
241CS034	Fundamentals of Data Science		2		1					-
241AI010	Natural Language Processing	AC	2		1	3	50	50	100	DAP
241AI019	(or) Data Visualization									
241AI016	Prompt Engineering & GenAI	AC	2		1	3	50	50	100	ML
241CS041	(or) Social Network Analysis									
241AI017	Federated Machine Learning	AC	2			2	50	50	100	ML
TOTAL			14		6	20				

Minor Degree in Civil Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CE025	Repair & Rehabilitation of Structures	FC	3			3	50	50	100	-
241CE043	Building Planning & Computer-Aided Drawing	FC			2	2	50	50	100	-
241CE027	Green Buildings	FC	3			3	50	50	100	-
241CE040	Fundamentals of Soil Behaviour	FC	3			3	50	50	100	-
241CE054	Railway Engineering (or)	FC	3			3	50	50	100	-
241CE047	Docks & Harbour Engineering									
241CE036	Environmental Impact & Risk Management	IC	3			3	50	50	100	-
241CE037	(or) Environmental Management									
241CE056	Urban Transportation Planning	IC	3			3	50	50	100	-
241CE049	(or) Intelligent Transportation Systems.									
TOTAL			18		2	20				

Minor Degree in Electrical and Electronics Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EE055	Operation & Control of Electric machines	FC	2			2	50	50	100	BEEE
241EE056	Fundamentals of Power Electronics	FC	2			2	50	50	100	BEEE
241EE013	Electrical Measurements & Instrumentation	FC	2		2	4	50	50	100	ENA-1/BEEE
241EE006	Electric Power Generation & Distribution Systems	IC	3			3	50	50	100	ENA-1/BEEE
241EE034	Alternative Energy Sources (or)	IC	3			3	50	50	100	EPGDS/ BEEE/ ISM
241EE027	Utilization of Electrical Energy									
241EE037	Hybrid Electric Vehicles (or)	AC	3			3	50	50	100	FPE/ OCEM
241EE035	Special Electric machines									
241EE043	Electrical Safety (or)	AC	3			3	50	50	100	EPGDS/ PSA
241EE030	Methods & Algorithms for Intelligent Control									
TOTAL			18		2	20				

Minor Degree in Mechanical Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241ME074	Basic Mechanical Engineering	FC	2			2	50	50	100	-
241ME004	Engineering Thermodynamics	IC	2	1		3	50	50	100	SSP/ MP
241ME077	Introduction to Automobile Engineering (or)	IC	3			3	50	50	100	SSP/ MP
241ME078	Mechanics of Solids									
241ME012	Heat Power Engineering (or)	IC	2	1		3	50	50	100	ETD
241ME040	Refrigeration & Air Conditioning									
241ME075	Production Technology	IC	3			3	50	50	100	EW
241ME076	Metallurgy & Material Science	IC	3			3	50	50	100	SSP/ MP
241ME079	Theory of Machines (or)	AC	3			3	50	50	100	SSP/ MP
241ME080	Advanced Engineering Metrology									
TOTAL			18	2		20				

Minor Degree in Electronics and Communication Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EC087	Fundamentals of Communications	FC	2		1	3	50	50	100	-
241EC088	Fundamentals of Signal Processing	FC	2		1	3	50	50	100	-
241EC089	Analog & Digital Circuits	IC	2			2	50	50	100	BEEE
241EC042	Wireless LAN's & PAN's	IC	3			3	50	50	100	-
241EC090	Linear & Digital IC Applications (or) Sensors & Actuators	IC	3			3	50	50	100	ADC
241EC091										
241EC092	Embedded Microcontrollers (or) Digital System Design	IC	2		1	3	50	50	100	ADC, PPSC
241EC093										
241EC067	Introduction to Internet of things (or) Modern Wireless Communications	AC	2		1	3	50	50	100	EM, WLAN's & PAN's
241EC074			3			3	50	50	100	FC
TOTAL						20				

Minor Degree in Petroleum Technology

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241PT027	Introduction to Petroleum Engineering	FC	2			2	50	50	100	-
241PT035	Unit Operations in Petroleum Industry	FC	3			3	50	50	100	-
241PT047	Fundamentals of Geology & Reservoir Engineering	IC	3			3	50	50	100	-
241PT048	Fundamentals of Drilling & Production Engineering (or) Unconventional Hydrocarbon Resources	IC	3			3	50	50	100	-
241PT016										
241PT049	Natural Gas Hydrates (or) Fundamentals of Liquefied Natural Gas	AC	3			3	50	50	100	-
241PT005										
241PT050	Artificial Lift Techniques (or) Enhanced Oil Recovery	AC	3			3	50	50	100	-
241PT003										
241PT012	Petroleum Refinery Engineering	AC	3			3	50	50	100	-
TOTAL			20			20				

Minor Degree in Mining Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MN003	Development of Mineral Deposits	FC	3			3	50	50	100	-
241MN041	Green Mining	FC	3			3	50	50	100	-
241MN006	Surface Mining	IC	3			3	50	50	100	DMD
241MN024	Drilling & Blasting	IC	3			3			100	DMD
241MN007	Underground Coal Mining Technology (or)	IC	3			3	50	50	100	DMD
241MN008	Underground Metal Mining Technology									
241MN014	Mine Legislation & General Safety (or)	AC	3			3	50	50	100	UCMT / UMMT
241MN028	Environmental Pollution & Control									
241MN045	Industrial Safety Practices (or)	AC	2			2	50	50	100	-
241MN046	Ground Control									
TOTAL			20			20				

Minor Degree in Agricultural Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AE082	Fundamentals of Renewable Energy Sources	FC	3			3	50	50	100	
241AE083	Post-harvest Engineering of Cereal Crops	FC	3			3	50	50	100	
241AE084	Ground Water Hydrology	FC	3			3	50	50	100	
241AE085	Micro Irrigation Systems	IC	2			2	50	50	100	
241AE086	Surface Water Hydrology (or)	IC	3			3	50	50	100	GWH
241AE087	Land & Water Management Engineering									
241AE088	Agricultural Process Engineering & Food Quality (or)	AC	3			3	50	50	100	PHECC
241AE089	Post-harvest Engineering for Horticultural Produce									
241AE090	Agricultural Machinery & Equipment (or)	AC	3			3	50	50	100	FRES
241AE091	Design of Bio-energy systems									
TOTAL			20			20				

Minor Degree in Entrepreneurship Development & Incubation

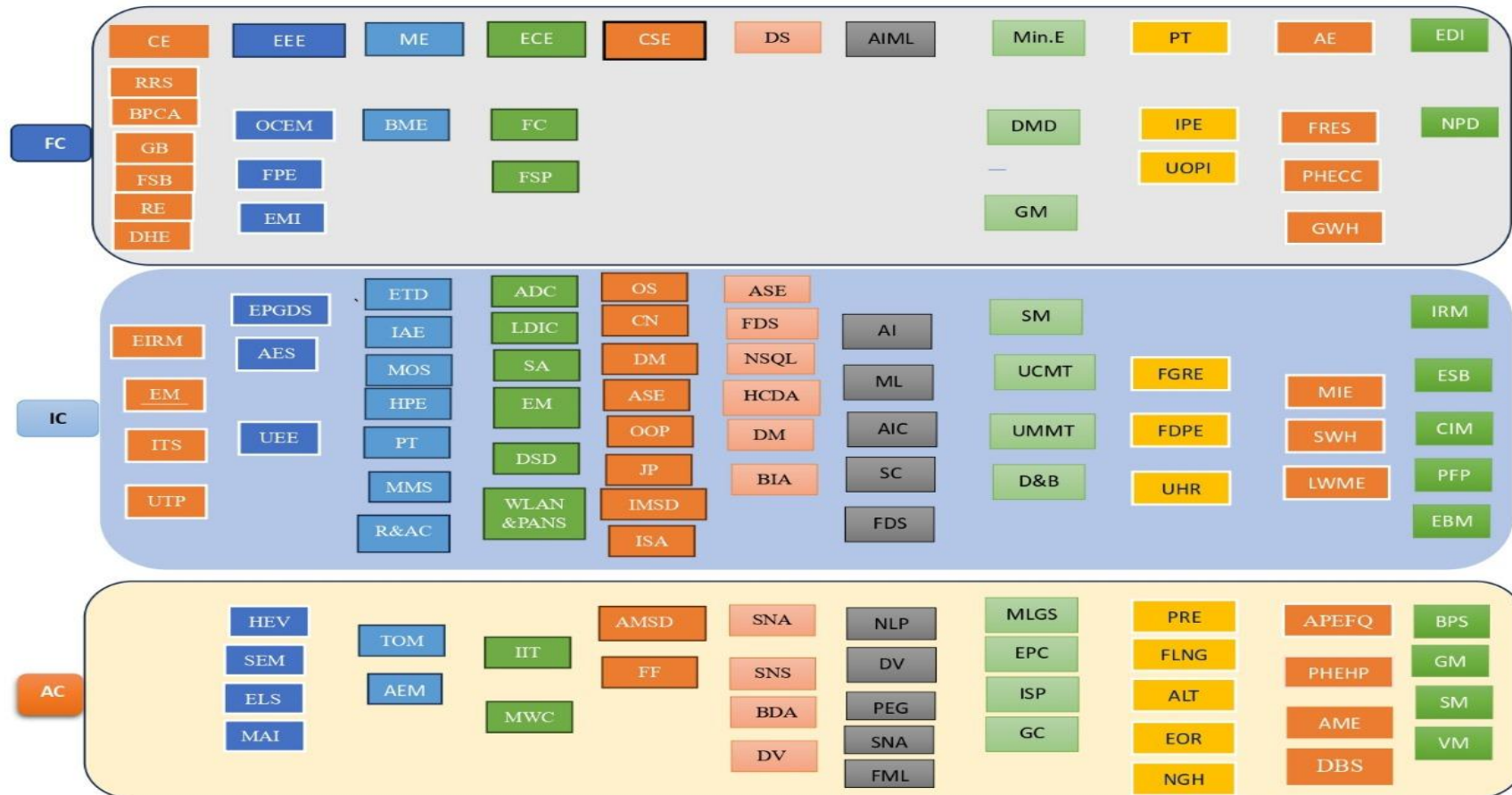
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MB007	New Product Development	FC	3			3	50	50	100	-
241MB008	Entrepreneurship & Small Business Management	IC	2			2	50	50	100	-
241MB009	Insurance & Risk Management	IC	3			3	50	50	100	-
241MB010	Change & Innovations Management	IC	3			3	50	50	100	-
241MB011	Personal Financial Planning (or)	IC	3			3	50	50	100	-
241MB012	E-Business management									
241MB013	Business Policy & Strategic Management (or)	AC	3			3	50	50	100	-
241MB014	Green Marketing									
241MB015	Startup Management (or)	AC	3			3	50	50	100	-
241MB016	Venture Management									
TOTAL			20			20				

Minor Degree in Quantum Technologies

S.No.	Course Code	Course Name	L	T	P	C	Semester
Mandatory Courses							
1	241EC097	Survey of Quantum technologies and Application	3	0	0	3	IV
2	241EC098	Foundations of Quantum Technologies	3	0	0	3	V
3	241EC099	Basic Programming Lab (or)	1	0	2	3	V
	241EC100	Basic Laboratory Course for Quantum Technologies					
4	241EC101	Quantum Algorithms and Cryptography	12 week 3 Credit - NPTEL MOOC			3	VII/VIII
Any One course from the below							
5	241EC102	Introduction to Quantum Computation	3	0	0	3	VI
6	241EC103	Introduction to Quantum Communication	3	0	0	3	VI
7	241EC104	Introduction to Quantum Sensing	3	0	0	3	VI
8	241EC105	Introduction to Quantum Materials	3	0	0	3	VI

Any One course from the below							
9	241EC106	Engineering Foundations of Quantum Technologies	3	0	0	3	VII
10	241EC107	Solid State Physics for Quantum Technologies	3	0	0	3	VII
11	241EC108	Quantum Optics	3	0	0	3	VII
12	241EC109	Quantum Cybersecurity	3	0	0	3	VII
13	241EC110	Quantum Machine Learning	3	0	0	3	VII
Total			18	0	0	18	

Minor Degree Pre-requisite Flow Chart



Dept.	FOUNDATION COURSE		INTERMEDIATE- LEVEL COURSE		ADVANCED COURSE		
CE	RRS	Repair & Rehabilitation of Structures	EIRM	Environmental Impact & Risk Management			
	BPCA	Building Planning & Computer-Aided Drawing	EM	Environmental Management			
	GB	Green Building	UTP	Urban Transportation Planning			
	FSB	Fundamental of Soil Behaviour	ITS	Intelligent Transportation Systems			
	RE	Railway Engineering					
	DHE	Docks & Harbour Engineering					
EEE	OCEM	Operation control of Electric Machines	AES	Alternative Energy Sources	MAI	Methods & Algorithms for Intelligent Control	
	FPE	Fundamentals of Power Electronics	EPGDS	Electric Power Generation & Distribution Systems	HEV	Hybrid Electric Vehicles	
	EMI	Electrical Measurements & Instrumentation	UEE	Utilization of Electrical Energy	SEM	Special Electric Machines	
					ES	Electrical Safety	
ME	BME	Basic Mechanical Engineering	ETD	Engineering Thermodynamics	TOM	Theory of Machines	
			IAE	Introduction to Automobile Engineering	AEM	Advanced Engineering Metrology	
			MOS	Mechanics of Solids			
				HPE	Heat Power Engineering		
				PT	Production Technology		
				MMS	Metallurgy & Material Science		
				R&AC	Refrigeration & Air Conditioning		
ECE	FC	Fundamentals of Communications	ADC	Analog & Digital Circuits	IIT	Introduction to Internet of things	
			LDIC	Linear & Digital IC Applications			
			SA	Sensors & Actuators			
	FSP	Fundamentals of Signal Processing	EM	Embedded Microcontrollers	MWC	Modern Wireless Communications	
			DSD	Digital System Design			
			WLAN & PAN	Wireless LANS & PANS			
CSE			ASE	Agile Software Engineering	WADM S	Web Application Development using MERN Stack	
			OOP	Object Oriented Programming through C++			
			OS	Operating Systems	FF	Flutter Fundamentals	
			CN	Computer Networks			
			JP	Java Programming			
			PC++	Programming with C++			
			ISA	Information Security Analysis and Audit			
			DM	Data Mining			
DS			DM	Data Mining	SNA	Social Network Analysis	
			FDS	Fundamentals of Data Science	DV	Data Visualization	
			ASE	Agile Software Engineering	BDA	Big Data Analytics	
			NSQL	NoSQL Databases	SNSW	Social Networks and Semantic Web	
			BIA	Business Intelligence &			

				Analytics		
			HCDA	Health Care Data Analysis		
AIML			ML	Machine Learning	DV	Data Visualization
			AI	Artificial Intelligence	PEG	Prompt Engineering and GenAI
			AI C	AI Chatbot	SNA	Social Network Analysis
			FDS	Fundamentals of Data Science	FML	Federated Machine Learning
			SC	Soft Computing	NLP	Natural Language Processing
Min.E	DMD	Development of Mineral Deposits	SM	Surface Mining	MLGS	Mine Legislation and General Safety
	GM	Green Mining	UCMT	Underground Coal Mining Technology	EPC	Environmental Pollution & Control
			UMMT	Underground Metal Mining Technology	ISP	Industrial Safety Practices
			DB	Drilling & Blasting	GC	Ground Control
PT	IPE	Introduction to Petroleum Engineering	FGRE	Fundamentals of Geology and Reservoir Engineering	PRE	Petroleum Refinery Engineering
	UOPI	Unit operations in Petroleum Industry	FDPE	Fundamentals of Drilling and Production Engineering	FLNG	Fundamentals of Liquefied Natural Gas
					NGH	Natural Gas Hydrates
			UHR	Unconventional Hydrocarbon Resources	ALT	Artificial Lift Techniques
				EOR	Enhanced Oil Recovery	
Ag.E	GWH	Ground Water Hydrology	LWME	Land and Water Management	DBS	Design of Bio-Energy Systems
	PHEC C	Post-harvest Engineering of Cereal Crops	SWH	Surface Water Hydrology	PHEHP	Post-Harvest Engineering for Horticultural Produce
			MIE	Micro Irrigation Systems		
	FRES	Fundamentals of Renewable Energy Sources			AME	Agricultural Machinery and Equipment
				APEFQ	Agriculture Process Engineering and Food Quality	
EDC	NPD	New Product Development	ESB	Entrepreneurship and Small Business Management	BPS	Business Policy & Strategic Management
			CIM	Change & Innovations Management	GM	Green Marketing
			PFP	Personal Financial Planning	SM	Startup Management
			EBM	E-Business Management	VM	Venture Management
			IRM	Insurance and Risk Management		