SHIV NADAR UNIVERSITY
CHENNAI

School of Engineering

Department of Computer Science and Engineering

B. TECH

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CURRICULUM

SEMESTER - I

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	EN1001	Communicative English	HS	3	2	1	0	3
2.	MA1001	Linear Algebra	BS	4	3	1	0	4
3.	PH1001T	Engineering Physics	BS	3	3	0	0	3
4.	BS1001	Environmental Science and Engineering	BS	2	2	0	0	2
5.	CS1001	Programming in C	ES	3	3	0	0	3
6.	CS1703	Digital Design + Lab	ES	4	2	0	2	3
7.	EA1001T	Extra Academic Activity	AEA*	2	0	0	0	1
PRACTICALS								
8.	CS1801	Programming in C Lab	ES	4	0	0	4	2
9.	PH1801T	Engineering Physics Lab	BS	4	0	0	4	2
			TOTAL	**29**	**15**	**2**	**10**	**23**

SEMESTER – II

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	EN1002	English for Engineers	HS	3	2	1	0	3
2.	MA1004	Statistical Foundations of Data Science	BS	3	3	0	0	3
3.	CS1002	Programming in Python	ES	2	2	0	0	2
4.	CS1006T	Data Structures	PC	3	3	0	0	3
5.	CS1004	Computer Organization and Architecture	ES	3	3	0	0	3
6.	CS1704	Foundations of Data Science + Lab	PC	5	3	0	2	4
7.	EA1001T	Extra Academic Activity	AEA*	2	0	0	0	1
PRACTICALS								
8.	CS1804T	Data Structures Lab	PC	4	0	0	4	2
9.	CS1802	Programming in Python Lab	ES	4	0	0	4	2
			TOTAL	**29**	**16**	**1**	**10**	**23**

***Ability Enhancement Activity – 40 Hours per semester**

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SEMESTER – III

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	MA2003	Discrete Mathematics	BS	4	3	1	0	4
2.	CS2003	Object Oriented Programming	PC	3	3	0	0	3
3.	CS2701	Operating Systems + Lab	PC	5	3	0	2	4
4.	CS2007	Artificial Intelligence	PC	3	3	0	0	3
5.	CS2009	Exploratory Data Analysis and Data Visualization	PC	2	2	0	0	2
6.	HS2001	Cognitive Psychology	HS	2	2	0	0	2
PRACTICALS								
7.	CS2803	Object Oriented Programming Lab	PC	4	0	0	4	2
8.	CS2805	Exploratory Data Analysis and Data Visualization Lab	PC	4	0	0	4	2
			TOTAL	**27**	**16**	**1**	**10**	**22**

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SEMESTER – IV

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	CS2004	Design and Analysis of Algorithms	PC	3	3	0	0	3
2.	CS2001T	Database Management Systems	PC	3	3	0	0	3
3.	CS2702	Computer Networks + Lab	PC	5	3	0	2	4
4.	CS2012	Machine Learning Techniques	PC	3	3	0	0	3
5.	CS2010	Data Mining	PC	1	1	0	0	1
6.		Open Elective - I	OE	3	3	0	0	3
PRACTICALS								
7.	CS2801T	Database Management Systems Lab	PC	4	0	0	4	2
8.	CS2806	Machine Learning Techniques Lab	PC	4	0	0	4	2
			TOTAL	**26**	**16**	**0**	**10**	**21**

SEMESTER - V

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	MA3001	Optimization Techniques	BS	3	3	0	0	3
2.	CS3005	Web Technologies	PC	3	3	0	0	3
3.	MA3003	Statistical Inference	BS	3	3	0	0	3
4.	CS3007	Big Data Analytics	PC	3	3	0	0	3
5.	BM3003	Principles of Management	HS	2	2	0	0	2
6.	CS3011	Introduction to Robotics	ES	3	3	0	0	3
7.	CS3009	Introduction to Digital Signal Processing	ES	1	1	0	0	1
PRACTICALS								
8.	CS3809	Big Data Analytics Lab	PC	4	0	0	4	2
9.	CS3801	Web Technologies Lab	PC	2	0	0	2	1
			TOTAL	**24**	**18**	**0**	**6**	**21**

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SEMESTER - VI

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	CS3008	Image and Video Processing	ES	3	3	0	0	3
2.	BM3000T	Business Basics for Entrepreneurs (Audit Course)	HS	2	2	0	0	0
3.	CS3012	Natural Language Processing	PC	3	3	0	0	3
4.	CS3010	Introduction to Speech Signal Processing	ES	1	1	0	0	1
5.		Professional Elective I	PE	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
7.		Open Elective - II	OE	3	3	0	0	3
PRACTICALS								
8.	CS3804	Image and Video Processing Lab	ES	4	0	0	4	2
9.	CS3806	Natural Language Processing Lab	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**20**

SEMESTER – VII

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	CS4007	Deep Learning	PC	3	3	0	0	3
2.	CS4009	Speech Technology	ES	3	3	0	0	3
3.		Professional Elective III	PE	3	3	0	0	3
4.		Professional Elective IV	PE	3	3	0	0	3
5.		Open Elective III	OE	3	3	0	0	3
PRACTICALS								
6.	CS4803	Deep Learning Lab	PC	4	0	0	4	2
7.	CS4997	Capstone Project I	EEC	6	0	0	6	3
			TOTAL	**25**	**15**	**0**	**10**	**20**

SEMESTER – VIII

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.		Professional Elective V	PE	3	3	0	0	3
2.		Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
3.	CS4996	Capstone Project II	EEC	12	0	0	12	6
			TOTAL	**18**	**6**	**0**	**12**	**12**

TOTAL NO. OF CREDITS: 162

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PROFESSIONAL ELECTIVES (PE)

SEMESTER VI

ELECTIVE – I

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS3674	Advanced Machine learning	PE	3	3	0	0	3
2.	CS3672	Data Science for Business	PE	3	3	0	0	3
3.	CS3699T	Introduction to Cyber Security	PE	3	3	0	0	3
4.	CS3670	Sensors and Actuators	PE	3	3	0	0	3
5.	CS3691T	Data Preprocessing	PE	3	3	0	0	3
6.	CS3668	Parallel Processing	PE	3	3	0	0	3

SEMESTER VI

ELECTIVE – II

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS3666	Data Visualization	PE	3	3	0	0	3
2.	CS3664	Industry 4.0	PE	3	3	0	0	3
3.	CS3686	Digital Forensics	PE	3	3	0	0	3
4.	CS3662	Control Systems	PE	3	3	0	0	3
5.	CS3660	Pattern Recognition and ANN	PE	3	3	0	0	3
6.	CS3658	High Performance Computing	PE	3	3	0	0	3

SEMESTER VII

ELECTIVE – III

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS4687	Semantic Web Technology	PE	3	3	0	0	3
2.	CS4685	Media Planning and Strategies	PE	3	3	0	0	3
3.	CS4683	Cryptography and Network Security	PE	3	3	0	0	3
4.	CS4689	Augmented and Virtual Reality	PE	3	3	0	0	3
5.	CS4681	Graphs - Algorithms and Mining	PE	3	3	0	0	3
6.	CS3689	Quantum computing	PE	3	3	0	0	3

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SEMESTER VII

ELECTIVE – IV

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS4679	Reinforcement Learning	PE	3	3	0	0	3
2.	CS4677	Ethics for Data Science	PE	3	3	0	0	3
3.	CS4675	Data Security and Privacy	PE	3	3	0	0	3
4.	CS4673	Microcontrollers for IoT	PE	3	3	0	0	3
5.	CS4671	Bioinformatics	PE	3	3	0	0	3
6.	CS4669	GPU Architectures and Programming	PE	3	3	0	0	3

SEMESTER VIII

ELECTIVE – V

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS4674	Information Retrieval	PE	3	3	0	0	3
2.	CS4672	Developing Data Products	PE	3	3	0	0	3
3.	CS4698	Vulnerability Assessment and Penetration testing	PE	3	3	0	0	3
4.	CS4692	Drone Technology	PE	3	3	0	0	3
5.	CS4670	Time Series Analysis	PE	3	3	0	0	3
6.	CS4668	Distributed Computing for Data Science and AI	PE	3	3	0	0	3

SEMESTER VIII

ELECTIVE – VI

Sl. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS4666	Nature Inspired Computing	PE	3	3	0	0	3
2.	CS4664	Simulation Techniques in Finance	PE	3	3	0	0	3
3.	CS4662	Cognitive Cyber Security	PE	3	3	0	0	3
4.	CS4660	AI for Robotic Communication	PE	3	3	0	0	3
5.	CS4658	Social Media Mining	PE	3	3	0	0	3
6.	CS4656	Functional Programming	PE	3	3	0	0	3

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PROGRAM STRUCTURE - B.Tech AI & DS

S. No	Topics	Credit Breakup for B. Tech AI & DS	AICTE Breakup for CSE
1.	HS: Humanities and Social Sciences including Management courses	10	12
2.	BS: Basic Science courses	24	24
3.	ES: Engineering Science Courses	28	29
4.	PC: Professional Core Courses	62	49
5.	PE: Professional Elective courses relevant to chosen specialization/branch	18	18
6.	OE: Open electives	9	12
7.	EEC: Project Work, Seminar and internship in industry, etc. and ability enhancement activity (AEA)	11	15
	Total	**162**	**159**

SEMESTER-WISE CREDITS BREAKUP

Category\Sem	HS	BS	ES	PC	PE	OE	EEC/AEA	Total
1	3	11	8				1	23
2	3	3	7	9			1	23
3	2	4		16				22
4				18		3		21
5	2	6	4	9				21
6			6	5	6	3		20
7			3	5	6	3	3	20
8					6		6	12
Total	10	24	28	62	18	9	11	162

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OPEN ELECTIVES (OE)

Each department of the University (under school of Engineering), will offer two open-elective courses (typically, 3 credits each) to the students of other departments. The list of offered courses will be provided by the departments, based on current requirements.

MICRO-SPECIALIZATION

The University proposes to offer Micro-Specializations to UG students. Its salient features are as follows:

1. Each Micro-Specialization has a defined structure in terms of three sequential components:
    - **Component-I** – One Foundation course that constitutes a mandatory requirement and also a pre-requisite for subsequent components
    - **Component-II**- Two courses from a specified stream
    - **Component-III**- Project/Design/Term Paper

2. A Student would be required to complete all the three components (10-12 credits) from the specified stream in order to earn a Micro-Specialization.

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Eligibility for Micro-Specialisation registration

In order to register for a Micro-Specialization, the student must have completed all curricular requirements up to the previous semester and have a CGPA $\geq$ 8.0. Thereafter the student must maintain a CGPA $\geq$ 8.0 without any backlog in the subsequent semesters to keep the Micro-Specialization registration active.

Provisional list of Micro Specialization courses

1. Artificial Intelligence and Data Science

(Shall be offered to all the programs except B. Tech (AI & DS))

- Foundations of Data Science + lab (4 credits)
- Statistical Inference (3 credits)
- Deep Learning (3 credits)

2. Internet of Things

(Shall be offered to all the programs except B. Tech-CSE (IoT))

- Introduction to Internet of Things + Lab (4 credits)
- Software and Programming in IoT (3 credits)
- IoT architecture and Protocols (3 credits)

3. Med Tech

(Shall be offered to all the programs)

- Sensors for healthcare (4 credits)
- Medical Instrumentation (3 credits + lab 1 credit)
- Wearable devices and Mobile health/ IoMT/Big data analytics in Healthcare/ Neurorehabilitation and Brain Computer Interface (3 credits)

4. Applied Robotics

Shall be offered to all the programs)

- Robotics for Engineers (3 credits)
- Robot System Design (4 credits)
- Intelligent Robotics (3 credits)

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