



# Graphic Era

Deemed to be University

Accredited by NAAC with Grade A

Approved by AICTE, Ministry of HRD, Govt. of India

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**BACHELOR OF TECHNOLOGY**

**Artificial Intelligence and Machine Learning**

## Course Components of Academic Programme B.Tech (Artificial Intelligence and Machine Learning)

Minimum Duration	:	8 Semesters (4 Years)
Maximum Duration	:	12 Semesters (6 Year)
Total Number of Credits	:	195 Credits

	Course Components	Credits
<b>1.</b>	<b>Compulsory Courses</b>	
I.	Basic Science Courses (BSC)	16
II.	Engineering Science Courses (ESC)	24
III.	Core Courses (CC)	93
<b>2.</b>	<b>Elective Courses</b>	
I.	Programme Elective Courses (PEC)	14
II.	Open Elective Courses (OEC)	9
<b>3.</b>	<b>Discipline-Centric Additional Courses</b>	
I.	Seminar(SM) /Project (PJ)/ Intern(IN)/ Comprehensive Viva-Voce (CM)	15
II.	Humanities and Social Science Including Management (HSMC)	14
<b>4</b>	<b>General Courses</b>	
I.	Healthy Living and Fitness (HF)	1
II.	Environmental Science (EV)	2
III.	General Proficiency (GP)	8

A. Requirement of Awards of Degree: - CGPA  $\geq$  4.5 Clearance of total no. of credits as 195 and any other condition as per regulation and ordinances.

B. Audit Courses (AC) upto 4 credits may be done by a student as Extra Course(s) over and above the requirement for award of this degree.

## B.Tech (Artificial Intelligence and Machine Learning) CURRICULUM STRUCTURE AND EVALUATION SCHEME W.E.F 2021-22

**SEMESTER: I**

COURSE MODULE Physics Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION				
COURSE				Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component									
THU101	Professional Communication	HSMC	2	2	-	-	25	25	50	100	
TPH101	Engineering Physics	BSC	3	3	-	-	25	25	50	100	
TMA101	Engineering Mathematics-I	BSC	4	3	1	-	25	25	50	100	
TEE101	Basic Electrical Engineering	ESC	3	3	-	-	25	25	50	100	
TCS101	Fundamental of Computer & Introduction to Programming	ESC	3	3	-	-	25	25	50	100	
THF101	Healthy Living & Fitness	HF	1	1	-	-	50	-	50	100	
PPH151	Physics Lab	BSC	1	-	-	2	25	25	50	100	
PEE151	Basic Electrical Engineering Lab.	ESC	1	-	-	2	25	25	50	100	
PME151	Workshop and Manufacturing Practices	ESC	3	1	-	4	25	25	50	100	
PCS151	Computer Lab-I	ESC	2	-	-	4	25	25	50	100	
GP101	General Proficiency	GP	1	-	-	-	-	-	100	100	
<b>Total</b>			<b>24</b>	<b>16</b>	<b>1</b>	<b>12</b>	<b>275</b>	<b>225</b>	<b>600</b>	<b>1100</b>	

COURSE MODULE Chemistry Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION				
COURSE				Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component									
THU101	Professional Communication	HSMC	2	2	-	-	25	25	50	100	
TCH101	Engineering Chemistry	BSC	3	3	-	-	25	25	50	100	
TMA101	Engineering Mathematics-I	BSC	4	3	1	-	25	25	50	100	
TEC101	Basic Electronics Engineering	ESC	3	3	-	-	25	25	50	100	
TEV101	Environmental Science	EV	2	2	-	-	25	25	50	100	
TCS101	Fundamental of Computer & Introduction to Programming	ESC	3	3	-	-	25	25	50	100	
PCH151	Chemistry Lab	BSC	1	-	-	2	25	25	50	100	
PME153	Engg. Graphics and Design Lab.	ESC	3	1	-	4	25	25	50	100	
PCS151	Computer Lab - I	ESC	2	-	-	4	25	25	50	100	
PEC151	Basic Electronics Engineering Lab.	ESC	1	-	-	2	25	25	50	100	
GP101	General Proficiency	GP	1	-	-	-	-	-	100	100	
<b>Total</b>			<b>25</b>	<b>17</b>	<b>1</b>	<b>12</b>	<b>250</b>	<b>250</b>	<b>600</b>	<b>1100</b>	

## SEMESTER II

COURSE MODULE Physics Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION				
COURSE				Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component									
THU201	Advanced Professional Communication	HSMC	2	2	-	-	25	25	50	100	

TPH201	Engineering Physics	BSC	3	3	-	-	25	25	50	100
TMA201	Engineering Mathematics-II	BSC	4	3	1	-	25	25	50	100
TEE201	Basic Electrical Engineering	ESC	3	3	-	-	25	25	50	100
TCS201	Programming for Problem Solving	ESC	3	3	-	-	25	25	50	100
THF201	Healthy Living & Fitness	HF	1	1	-	-	50	-	50	100
PPH251	Physics Lab	BSC	1	-	-	2	25	25	50	100
PEE201	Basic Electrical Engineering Lab.	ESC	1	-	-	2	25	25	50	100
PME251	Workshop and Manufacturing Practices	ESC	3	1	-	4	25	25	50	100
PCS251	Computer Lab-II	ESC	2	-	-	4	25	25	50	100
GP201	General Proficiency	GP	1	-	-	-	-	-	100	100
<b>Total</b>			<b>24</b>	<b>16</b>	<b>1</b>	<b>12</b>	<b>275</b>	<b>225</b>	<b>600</b>	<b>1100</b>

COURSE MODULE Chemistry Group				TEACHING PERIODS			WEIGHTAGE : EVALUATION				
COURSE				Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component									
THU201	Advanced Professional Communication	HSMC	2	2	-	-	25	25	50	100	
TCH201	Engineering Chemistry	BSC	3	3	-	-	25	25	50	100	
TMA201	Engineering Mathematics-II	BSC	4	3	1	-	25	25	50	100	
TEC201	Basic Electronics Engineering	ESC	3	3	-	-	25	25	50	100	
TEV201	Environmental Science	EV	2	2	-	-	25	25	50	100	
TCS201	Programming for Problem Solving	ESC	3	3	-	-	25	25	50	100	
PCH251	Chemistry Lab	BSC	1	-	-	2	25	25	50	100	
PME253	Engg. Graphics and Design Lab.	ESC	3	1	-	4	25	25	50	100	
PCS251	Computer Lab - II	ESC	2	-	-	4	25	25	50	100	
PEC251	Basic Electronics Engineering Lab.	ESC	1	-	-	2	25	25	50	100	
GP201	General Proficiency	GP	1	-	-	-	-	-	100	100	
<b>Total</b>			<b>25</b>	<b>17</b>	<b>1</b>	<b>12</b>	<b>250</b>	<b>250</b>	<b>600</b>	<b>1100</b>	

### SEMESTER: III

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE : EVALUATION				
COURSE				Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component									
TCS-301	Logic Design	CC	3	3	-	-	25	25	50	100	
TCS-302	Data Structures with C	CC	3	3	-	-	25	25	50	100	
TCS-307	Object Oriented Programming with C++	CC	3	3	-	-	25	25	50	100	
TCS-372	Mathematics for AI and Machine Learning	CC	4	3	-	2	25	25	50	100	
TMA-316	Discrete Structures and Combinatorics	CC	4	3	1	-	25	25	50	100	

PCS-301	Logic Design Lab	CC	2	1	-	2	25	25	50	100
PCS-302	Data Structures Lab	CC	2	1	-	2	25	25	50	100
PCS-307	OOPS with C++ Lab	CC	2	1	-	2	25	25	50	100
XCS-301	Career Skills	HSMC	2	2	-	-	25	25	50	100
CSP-301	Mini Project	PJ	1	-	-	-	-	-	100	100
GP-301	General Proficiency	GP	1	-	-	-	-	-	100	100
	<b>Total</b>		<b>27</b>	<b>20</b>	<b>1</b>	<b>8</b>	<b>225</b>	<b>225</b>	<b>650</b>	<b>1100</b>

**AUDIT COURSE: TOC301 PROBABILITY AND STATISTICS**

**SEMESTER: IV**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE:EVALUATION				
COURSE			Credits	L	T	P	C	WA	MSE	ESE	Total
Code	Title	Component									
TCS-408	Java Programming Language	CC	3	3	-	-	25	25	50	100	
TCS-402	Finite Automata and Formal Languages	CC	4	3	1	-	25	25	50	100	
TCS-403	Microprocessors	CC	3	3	-	-	25	25	50	100	
TCS-404	Computer Organization	CC	4	3	1	-	25	25	50	100	
TCS-409	Design and Analysis of Algorithms	CC	3	3	-	-	25	25	50	100	
TCS-472	Introduction to AI and Neural Networks	CC	4	3	-	2	25	25	50	100	
PCS-408	Java Programming Lab	CC	2	1	-	2	25	25	50	100	
PCS-403	Microprocessors Lab	CC	2	1	-	2	25	25	50	100	
PCS-409	DAA Lab	CC	2	1	-	2	25	25	50	100	
XCS-401	Career Skills	HSMC	2	2	-	-	25	25	50	100	
CSP-401	Mini Project	PJ	1	-	-	-	-	-	100	100	
GP- 401	General Proficiency	GP	1	-	-	-	-	-	100	100	
	<b>Total</b>		<b>31</b>	<b>23</b>	<b>2</b>	<b>8</b>	<b>250</b>	<b>250</b>	<b>700</b>	<b>1200</b>	

**AUDIT COURSE: TOC 401 COMPETITIVE PROGRAMMING**

**SEMESTER: V**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE:EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TCS-501	System Software	CC	4	3	1	-	25	25	50	100
TCS-502	Operating Systems	CC	3	3	-	-	25	25	50	100
TCS-503	Data Base Management Systems	CC	3	3	-	-	25	25	50	100
TMA-502	Computer Based Numerical and Statistical techniques	CC	3	3	-	-	25	25	50	100
	Program Elective-I	PEC	4	3	-	2	25	25	50	100
PCS-506	Operating Systems Lab	CC	2	1	-	2	25	25	50	100
PCS-503	DBMS Lab	CC	2	1	-	2	25	25	50	100

PMA-502	CBNST Lab	CC	2	1	-	2	25	25	50	100
XCS-501	Career Skills	HSMC	2	2	-	-	25	25	50	100
CSP-501	Mini Project	PJ	1	-	-	-	-	-	100	100
GP-501	General Proficiency	GP	1	-	-	-	-	-	100	100
	<b>Total</b>		<b>27</b>	<b>20</b>	<b>1</b>	<b>8</b>	<b>225</b>	<b>225</b>	<b>650</b>	<b>1100</b>

**PROGRAM ELECTIVE-I**

AUDIT COURSE: TOC 502: FOUNDATIONS OF CLOUD COMPUTING TECHNOLOGIES

Course Code	Course Name
TCS572	Applied Machine Learning Using Python
TCS-542	Information Retrieval and Web Search
TCS-521	User Interface Design (Through Swayam)

**SEMESTER: VI**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE:EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TCS-601	Compiler Design	CC	3	3	-	-	25	25	50	100
TCS-611	Software Engineering	CC	3	3	-	-	25	25	50	100
TCS-604	Computer Networks-I	CC	3	3	-	-	25	25	50	100
TCS 693	Full Stack Web Development	CC	3	3	-	-	25	25	50	100
	Program Elective-II	PEC	4	3	-	2	25	25	50	100
PCS-601	Compiler Design Lab	CC	2	1	-	2	25	25	50	100
PCS611	Software Engineering Lab	CC	2	1	-	2	25	25	50	100
PCS 693	Web Development Lab	CC	2	1	-	2	25	25	50	100
XCS-601	Career Skills	HSMC	2	2	-	-	25	25	50	100
CSP-601	Mini Project	PJ	1	-	-	-	-	-	100	100
GP-601	General Proficiency	GP	1	-	-	-	-	-	100	100
	<b>Total</b>		<b>26</b>	<b>20</b>	<b>-</b>	<b>8</b>	<b>225</b>	<b>225</b>	<b>650</b>	<b>1100</b>

**PROGRAM ELECTIVE-II**

AUDIT COURSE: TOC601: COMPETITIVE

PROGRAMMING

Course Code	Course Name
TCS-672	Deep Learning with Keras and Tensorflow
TCS-627	Information retrieval and Natural Language Processing
TCS 673	Reinforcement Learning (Through Swayam)

**SEMESTER: VII**

COURSE MODULE				TEACHING PERIODS			WEIGHTAGE:EVALUATION			
COURSE			Credits	L	T	P	CWA	MSE	ESE	Total
Code	Title	Component								
TCS-703	Computer Networks-II	CC	3	3	-	-	25	25	50	100
TCS-704	Advance Computer Architecture	CC	3	3	-	-	25	25	50	100
	Open Elective-I	OEC	3	3	-	-	25	25	50	100

	Open Elective-II	OEC	3	3	-	-	25	25	50	100
	Program Elective-III	PEC	3	3	-	-	25	25	50	100
SCS-701	Seminar on Industrial Interaction	SM	1	-	-	-	-	-	100	100
CSP-701	Major Project- Phase 1	PJ	2	-	-	-	-	-	100	100
GP-701	General Proficiency	GP	1	-	-	-	-	-	100	100
	<b>Total</b>		<b>19</b>	<b>15</b>	<b>-</b>	<b>-</b>	<b>125</b>	<b>125</b>	<b>550</b>	<b>800</b>

#### PROGRAM ELECTIVE-III

Course Code	Component	Course Name
TCS-731	DE	Digital Forensics
TIT-721	DE	Business Intelligence
TCS-756	DE	Human computer interaction
TCS-722	DE	Data warehousing and data mining
TCS- 799	DE	Software Verification, Validation and Testing
TCS-717	DE	Robotics (Through Swayam)
TCS-748	DE	Speech Recognition and Understanding (Through Swayam)
TCS-743	DE	Foundation of Computer Security

#### OPEN ELECTIVE-I

COURSE CODE	COURSE NAME
TOE-715	Self Driven Devices using AI and ML
TOE-702	Sensor Networks
TOE-703	Intellectual Property Rights for Engineers
TOE-704	Entrepreneurship and Small Business Management
TOE-705	Human Resource Planning and Development
TOE-706	Digital Signal Processing

#### OPEN ELECTIVE-II

COURSE CODE	COURSE NAME
TOE-707	Cryptography and Network Security
TOE-708	Strategic Management
TOE-709	Customer Relationship Management
TOE-710	Corporate Communication
TOE-711	Digital Image Processing
TOE-712	Non-conventional resources and Energy systems

#### SEMESTER: VIII

COURSE DETAILS			TEACHING PERIODS			WEIGHTAGE:EVALUATION				
COURSE		Credits	L	T	P	CWA	MSE	ESE	Total	
Course	Title									Component
	Open Elective-III	OEC	3	3	-	-	25	25	50	100
TDM-881	Disaster Management	HSMC	2	2	-	-	25	25	50	100
	Program Elective-IV	PEC	3	3	-	-	25	25	50	100

CSC-801	Comprehensive Viva-Voce	CM	2	-	-	-	-	-	100	100
SCS 801	Seminar	SM	1	-	-	-	-	-	100	100
CSP-801	Project Phase-II	PJ	4	-	-	-	-	-	100	100
GP-801	General Proficiency	GP	1	-	-	-	-	-	100	100
	<b>Total</b>		<b>16</b>	<b>8</b>	<b>-</b>	<b>-</b>	<b>75</b>	<b>75</b>	<b>550</b>	<b>700</b>

#### Program Elective - IV

Course Code	CourseName
TCS821	Soft Computing
TCS822	Mobile Applications Development
TCS823	Multimedia Systems and Data Compression (Through Swayam)
TCS824	Computer Graphics (Through Swayam)
TCS826	Unix Systems Programming
TCS851	Storage Networks
TCS852	Pattern Recognition
TCS855	Agile Software Engineering
TCS857	Game Theory
TCS844	Biocomputation
TCS845	Advance Computer Vision
TCS846	Internet of Things

#### Open Elective-III

Course Code	Course Name
TOE-812	Advanced Deep Learning and Image Processing
TOE-802	Project Management
TOE-803	Corporate Leadership
TOE-804	Counseling Skills for Managers
TOE-805	Wind and Solar Energy Systems
TOE-806	Mobile Adhoc Networks
TOE-807	Embedded Systems
TOE-808	Speech Processing
TOE-809	Smart Grid Technology
Any other course offered by other department with same credit scheme	