



ANNA UNIVERSITY, CHENNAI  
NON- AUTONOMOUS AFFILIATED COLLEGES  
REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM

**B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS**

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- I. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics, Computer Science and Business systems for the applications relevant to various streams of Engineering and Technology.
- II. To enrich graduates with the core competencies necessary for applying knowledge of computer science and Data analytics tools to store, retrieve, implement and analyze data in the context of business enterprise
- III. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills and leadership qualities to solve real world problems and meet the diversified needs of industry, academia and research
- IV. To equip the graduates with entrepreneurial skills and qualities which help them to perceive the functioning of business, diagnose business problems, explore the entrepreneurial opportunities and prepare them to manage business efficiently.

II. PROGRAM OUTCOMES (POs)

- 1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2 **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.
- 3 **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.
- 4 **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.
- 5 **Modern 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.
- 6 **The engineer and society:** 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.
- 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

- 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10 **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.
- 11 **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.
- 12 **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.

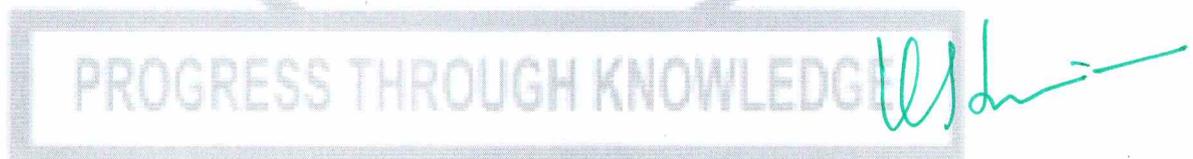
### III. PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To create, select, and apply appropriate techniques, resources, modern engineering and business tools including prediction and data analytics to complex engineering activities and business solutions

PSO2: To evolve computer science domain specific methodologies for effective decision making in several critical problem domains of the real world.

PSO3: To be able to apply entrepreneurial skills and management tools for identifying, analyzing and creating business opportunities with smart business ideas.

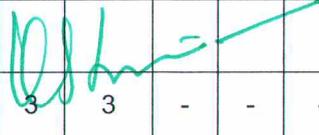
PSO4: To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications



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**Mapping of Course Outcome and Programme Outcome**

Year	Sem	Course name	PO												PSO				
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
I		Induction Programme																	
		Professional English - I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-	-	
		Matrices and Calculus	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-	-	
		Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-	-	
		Engineering Chemistry	2.8	1.3	1.6	1	-	1.5	1.8	-	-	-	-	1.5	-	-	-	-	
		Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	-	2	2	3	3	-	-
		தமிழர் மரபு /Heritage of Tamils																	
		Problem Solving and Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	-	2	2	3	3	-	-
		Physics and Chemistry Laboratory	3	2.4	2.6	1	1												
				2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	1.3	-	-	-	-
		English Laboratory \$	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-	-	
II		Professional English - II	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-	-	
		Statistics and Numerical Methods	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-	-	
		Physics for Information Science	3	1.3	2	1.3	2.3	1	1.3	-	-	-	-	2	-	-	-	-	
		Basic Electrical and Electronics Engineering	2	1.8	1	-	-	-	-	1	-	-	-	2	-	-	1	-	
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-	-	
		Data Structures Design																	
		தமிழரும் தொழில்நுட்பமும் /Tamils and Technology																	
		Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1	-	
		Data Structures Design Laboratory																	
		Communication Laboratory / Foreign Language \$	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-	-	
II	iii	Discrete Mathematics	1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
		Digital Principles and Computer Organization	3	3	3	3	1	2	1	1	1	1	1	1	2	1	1	3	
		Fundamentals of Economics	3	3	1	-	-	2	1	2	-	-	2	-	3	-	2	-	
		Object Oriented Programming	3	3	3	2	2	-	-	-	-	-	2	-	3	2	1.2	2	

  
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		Design and Analysis of Algorithms	3	3	3	2	-	-	1	-	-	-	-	-	3	3	-	2
		Fundamentals of Data Science and Analytics	3	3	3	2	2	1	-	-	-	-	-	-	3	3	1	1
		Business Communication Laboratory I	3	2	2	-	-	-	-	2	2	-	1	2	1	1	-	
		Object Oriented Programming Laboratory	2	2	2	2	2	-	-	-	2	2	2	2	2	2	2	2
		Professional Development <sup>s</sup>																
IV		Probability and Statistics	3	3	1	1	0	0	0	0	2	0	0	2	-	-	-	-
		Database Management Systems	3	3	2	2	2	-	-	-	-	-	-	-	3	3	3	-
		Operating Systems	3	3	3	2	-	2	-	-	2	-	-	2	3	3	-	-
		Introduction to Business Systems	3	2	2	2	1	1	2	1	2	1	2	1	3	2	2	1
		Machine Learning	3	3	3	2	2	1	-	-	-	-	-	-	3	3	2	-
		Environmental Sciences and Sustainability	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-	-
		Database Management Systems Laboratory	3	3	3	3	3	-	-	-	2	2	-	2	3	3	2	2
		Machine Learning Laboratory	3	3	3	3	3	2	-	-	2	2	1	2	3	3	2	2
		Business Communication Laboratory II	3	2	-	-	2	3	2	-	2	2	-	2	3	-	2	-
III	V	Embedded Systems and IoT	3	3	2.6	-	2	2	2	-	-	-	2	-	3	3	3	3
		Fundamentals of Management	3	3	2.2	2	-	2	2	2	2	2	-	-	3	3	3	3
		Data and Information Security	3	2.2	1.6	1	1	-	2	3	1	-	-	-	3	3	2	1
		Summer internship																
VI		Business Analytics	3	3	2.4	2.2	2	1.6	1.6	1.8	1.8	2.6	2.2	2	3	2	2.2	2.6
		Object Oriented Software Engineering	2	3	1	2	2	-	-	-	-	-	-	1	3	2		
		Business Analytics Laboratory	3	3	3	3	3	2	2	1	2	2	2	2	3	3	3	3
IV	VII	Human Values and Ethics																
	VIII	Project Work Internship																

1 - low, 2 - medium, 3 - high, '-' - no correlation



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**CHOICE BASED CREDIT SYSTEM**  
**CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII**  
**SEMESTER I**

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
<b>THEORY</b>								
2.	HS3152	Professional English - I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
7.	GE3152	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
<b>PRACTICALS</b>								
8.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10.	GE3172	English Laboratory §	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>10</b>	<b>27</b>	<b>22</b>

§ Skill Based Course

**SEMESTER II**

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	HS3252	Professional English - II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3256	Physics for Information Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	AD3251	Data Structures Design	PCC	3	0	0	3	3
7.	GE3252	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
8.		NCC Credit Course Level 1#	-	2	0	0	2	2*
<b>PRACTICALS</b>								
9.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
10.	AD3271	Data Structures Design Laboratory	PCC	0	0	4	4	2
11.	GE3272	Communication Laboratory / Foreign Language §	EEC	0	0	4	4	2
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>16</b>	<b>34</b>	<b>26</b>

# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

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**SEMESTER I**

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
<b>THEORY</b>								
2.	HS3152	Professional English - I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
7.	GE3152	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
<b>PRACTICALS</b>								
8.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10.	GE3172	English Laboratory §	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>10</b>	<b>27</b>	<b>22</b>

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**SEMESTER II**

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	HS3252	Professional English - II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3256	Physics for Information Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	AD3251	Data Structures Design	PCC	3	0	0	3	3
7.	GE3252	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
8.		NCC Credit Course Level 1#	-	2	0	0	2	2*
<b>PRACTICALS</b>								
9.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
10.	AD3271	Data Structures Design Laboratory	PCC	0	0	4	4	2
11.	GE3272	Communication Laboratory / Foreign Language §	EEC	0	0	4	4	2
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>16</b>	<b>34</b>	<b>26</b>

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**SEMESTER III**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	MA3354	Discrete Mathematics	BSC	3	1	0	4	4
2.	CS3351	Digital Principles and Computer Organization	ESC	3	0	2	5	4
3.	CW3301	Fundamentals of Economics	PCC	3	0	0	3	3
4.	CS3391	Object Oriented Programming	PCC	3	0	0	3	3
5.	AD3351	Design and Analysis of Algorithms	PCC	3	0	2	5	4
6.	AD3491	Fundamentals of Data Science and Analytics	PCC	3	0	0	3	3
<b>PRACTICALS</b>								
7.	CW3311	Business Communication Laboratory I	PCC	0	0	3	3	1.5
8.	CS3381	Object Oriented Programming Laboratory	PCC	0	0	3	3	1.5
9.	GE3361	Professional Development <sup>§</sup>	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>12</b>	<b>31</b>	<b>25</b>

<sup>§</sup> Skill Based Course

**SEMESTER IV**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	MA3391	Probability and Statistics	BSC	3	1	0	4	4
2.	CS3492	Database Management Systems	PCC	3	0	0	3	3
3.	AL3452	Operating Systems	PCC	3	0	2	5	4
4.	CW3401	Introduction to Business Systems	PCC	3	0	0	3	3
5.	AL3451	Machine Learning	PCC	3	0	0	3	3
6.	GE3451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.		NCC Credit Course Level 2 <sup>#</sup>		3	0	0	3	3 <sup>#</sup>
<b>PRACTICALS</b>								
8.	CS3481	Database Management Systems Laboratory	PCC	0	0	3	3	1.5
9.	AD3461	Machine Learning Laboratory	PCC	0	0	4	4	2
10.	CW3411	Business Communication Laboratory II	PCC	0	0	3	3	1.5
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>12</b>	<b>30</b>	<b>24</b>

<sup>#</sup> NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

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**SEMESTER V**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	CS3691	Embedded Systems and IoT	PCC	3	0	2	5	4
2.	CW3501	Fundamentals of Management	PCC	3	0	0	3	3
3.	CW3551	Data and Information Security	PCC	3	0	0	3	3
4.		Professional Elective I	PEC	-	-	-	-	3
5.		Professional Elective II	PEC	-	-	-	-	3
6.		Mandatory Course-I <sup>&amp;</sup>	MC	3	0	0	3	Non-credit course
<b>PRACTICALS</b>								
7.	CW3511	Summer Internship	EEC	0	0	0	0	2
<b>TOTAL</b>				-	-	-	-	<b>18</b>

<sup>&</sup> Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

**SEMESTER VI**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	CW3601	Business Analytics	PCC	3	0	0	3	3
2.	CCS356	Object Oriented Software Engineering	PCC	3	0	2	5	4
3.		Open Elective – I*	OEC	3	0	0	3	3
4.		Professional Elective III	PEC	-	-	-	-	3
5.		Professional Elective IV	PEC	-	-	-	-	3
6.		Professional Elective V	PEC	-	-	-	-	3
7.		Professional Elective VI	PEC	-	-	-	-	3
8.		Mandatory Course-II <sup>&amp;</sup>	MC	3	0	0	3	Non-credit course
9.		NCC Credit Course Level 3 <sup>#</sup>		3	0	0	3	3 <sup>#</sup>
<b>PRACTICALS</b>								
10.	CW3611	Business Analytics Laboratory	PCC	0	0	4	4	2
<b>TOTAL</b>				-	-	-	-	<b>24</b>

\*Open Elective – I Shall be chosen from the list of open electives offered by other Programmes

<sup>&</sup> Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

<sup>#</sup> NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA



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**SEMESTER VII / VIII\***

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	GE3791	Human Values and Ethics	HSMC	2	0	0	2	2
2.		Elective - Management <sup>#</sup>	HSMC	3	0	0	3	3
3.		Open Elective – II**	OEC	3	0	0	3	3
4.		Open Elective – III**	OEC	3	0	0	3	3
5.		Open Elective – IV**	OEC	3	0	0	3	3
<b>TOTAL</b>				<b>14</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>14</b>

\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

\*\* Open Elective II - IV (Shall be chosen from the list of open electives offered by other Programmes).

# Elective - Management shall be chosen from the Elective Management courses.

**SEMESTER VIII /VII\***

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>PRACTICALS</b>								
1.	CW3811	Project Work / Internship	EEC	0	0	20	20	10
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>	<b>10</b>

\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

**TOTAL CREDITS :163**

**ELECTIVE – MANAGEMENT COURSES**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	GE3751	Principles of Management	HSMC	3	0	0	3	3
2.	GE3752	Total Quality Management	HSMC	3	0	0	3	3
3.	GE3753	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE3754	Human Resource Management	HSMC	3	0	0	3	3
5.	GE3755	Knowledge Management	HSMC	3	0	0	3	3
6.	GE3792	Industrial Management	HSMC	3	0	0	3	3

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### MANDATORY COURSES I\*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	MX3082	Elements of Literature	MC	3	0	0	3	0
3.	MX3083	Film Appreciation	MC	3	0	0	3	0
4.	MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3	0

\*Mandatory Courses are offered as Non-Credit Courses

### MANDATORY COURSES II\*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3085	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX3089	Industrial Safety	MC	3	0	0	3	0

\*Mandatory Courses are offered as Non-Credit Courses

PROGRESS THROUGH KNOWLEDGE



**PRINCIPAL**

Mohamed Sathak A.J. College of Engineering  
No.34, Rajiv Gandhi Salai (OMR)  
Sipcot - IT Highway Egattur,  
Chennai - 603103.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

Vertical I Data Science	Vertical II Cloud Computing and Data Center Technologies	Vertical III Emerging Technologies	Vertical IV Artificial Intelligence and Machine Learning	Vertical V Management	Vertical VI Marketing
Exploratory Data Analysis	Cloud Computing	Augmented Reality/Virtual Reality	Knowledge Engineering	Customer Relation Management	Financial Analytics
Recommender Systems	Virtualization	Robotic Process Automation	Soft Computing	Human Resource Management for Entrepreneurs	Recommender Systems
Neural Networks and Deep Learning	Cloud Services Management	Neural Networks and Deep Learning	Neural Networks and Deep Learning	Financial Management	Digital Marketing
Text and Speech Analysis	Data Warehousing	Cyber security	Text and Speech Analysis	Supply Chain Management	Conversational Systems
Image and Video Analytics	Storage Technologies	Quantum Computing	Optimization Techniques	IT Project Management	Social Text and Media Analytics
Computer Vision	Software Defined Networks	Cryptocurrency and Blockchain Technologies	Game Theory	Entrepreneurship Development	Marketing Research and Marketing Management
Big Data Analytics	Stream Processing	Game Development	Cognitive Science	Introduction to Innovation, IP Management and Entrepreneurship	Risk Analytics
	Security and Privacy in Cloud	3D Printing and Design	Ethics and AI	Behavioral Economics	Enterprise Security

**Registration of Professional Elective Courses from Verticals:**

Refer to the Regulations 2021, Clause 6.3. (Amended on 27.07.2023)

**PRINCIPAL**

Mohamed Athar A.J. College of Engineering  
No. 1, Rajagandhi Salai (OMR)  
Sector 15, Highway Egattur,  
Chennai - 603103.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

**VERTICAL 1: DATA SCIENCE**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS346	Exploratory Data Analysis	PEC	2	0	2	4	3
2.	CCS360	Recommender Systems	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS369	Text and Speech Analysis	PEC	2	0	2	4	3
5.	CCS349	Image and Video Analytics	PEC	2	0	2	4	3
6.	CCS338	Computer Vision	PEC	2	0	2	4	3
7.	CCS334	Big Data Analytics	PEC	2	0	2	4	3

**VERTICAL 2: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS335	Cloud Computing	PEC	2	0	2	4	3
2.	CCS372	Virtualization	PEC	2	0	2	4	3
3.	CCS336	Cloud Services Management	PEC	2	0	2	4	3
4.	CCS341	Data Warehousing	PEC	2	0	2	4	3
5.	CCS367	Storage Technologies	PEC	3	0	0	3	3
6.	CCS365	Software Defined Networks	PEC	2	0	2	4	3
7.	CCS368	Stream Processing	PEC	2	0	2	4	3
8.	CCS362	Security and Privacy in Cloud	PEC	2	0	2	4	3



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### VERTICAL 3: EMERGING TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS333	Augmented Reality/Virtual Reality	PEC	2	0	2	4	3
2.	CCS361	Robotic Process Automation	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS340	Cyber Security	PEC	2	0	2	4	3
5.	CCS359	Quantum Computing	PEC	2	0	2	4	3
6.	CCS339	Cryptocurrency and Blockchain Technologies	PEC	2	0	2	4	3
7.	CCS347	Game Development	PEC	2	0	2	4	3
8.	CCS331	3D Printing and Design	PEC	2	0	2	4	3

### VERTICAL 4: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS350	Knowledge Engineering	PEC	2	0	2	4	3
2.	CCS364	Soft Computing	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS369	Text and Speech Analysis	PEC	2	0	2	4	3
5.	CCS357	Optimization Techniques	PEC	2	0	2	4	3
6.	CCS348	Game Theory	PEC	2	0	2	4	3
7.	CCS337	Cognitive Science	PEC	2	0	2	4	3
8.	CCS345	Ethics and AI	PEC	2	0	2	4	3



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**VERTICAL 5: MANAGEMENT**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CW3003	Customer Relation Management	PEC	3	0	0	3	3
2.	CMG341	Human Resource Management for Entrepreneurs	PEC	3	0	0	3	3
3.	CCD332	Financial Management	PEC	3	0	0	3	3
4.	CCD334	Supply Chain Management	PEC	3	0	0	3	3
5.	CW3007	IT Project Management	PEC	3	0	0	3	3
6.	CW3005	Entrepreneurship Development	PEC	2	0	2	4	3
7.	CW3006	Introduction to Innovation, IP Management and Entrepreneurship	PEC	3	0	0	3	3
8.	CW3001	Behavioral Economics	PEC	3	0	0	3	3

**VERTICAL 6: MARKETING**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG354	Financial Analytics	PEC	3	0	0	3	3
2.	CCS360	Recommender Systems	PEC	2	0	2	4	3
3.	CCW332	Digital Marketing	PEC	2	0	2	4	3
4.	CW3002	Conversational Systems	PEC	3	0	0	3	3
5.	CW3009	Social Text and Media Analytics	PEC	3	0	0	3	3
6.	CCB331	Marketing Research and Marketing Management	PEC	3	0	0	3	3
7.	CW3008	Risk Analytics	PEC	3	0	0	3	3
8.	CW3004	Enterprise Security	PEC	3	0	0	3	3



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**OPEN ELECTIVES**

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories).

**OPEN ELECTIVES – I**

S. NO.	COURSE ODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OAS351	Space Science	OEC	3	0	0	3	3
2.	OIE351	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3.	OBT351	Food, Nutrition and Health	OEC	3	0	0	3	3
4.	OCE351	Environmental and Social Impact Assessment	OEC	3	0	0	3	3
5.	OEE351	Renewable Energy System	OEC	3	0	0	3	3
6.	OEI351	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
7.	OMA351	Graph Theory	OEC	3	0	0	3	3

**OPEN ELECTIVES – II**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OIE352	Resource Management Techniques	OEC	3	0	0	3	3
2.	OMG351	Fintech Regulation	OEC	3	0	0	3	3
3.	OFD351	Holistic Nutrition	OEC	3	0	0	3	3
4.	AI3021	IT in Agricultural System	OEC	3	0	0	3	3
5.	OEI352	Introduction to Control Engineering	OEC	3	0	0	3	3
6.	OPY351	Pharmaceutical Nanotechnology	OEC	3	0	0	3	3
7.	OAE351	Aviation Management	OEC	3	0	0	3	3

**OPEN ELECTIVES – III**

SL. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2.	OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3
3.	OMG353	Democracy and Good	OEC	3	0	0	3	3

		Governance						
4.	CME365	Renewable Energy Technologies	OEC	3	0	0	3	3
5.	OME354	Applied Design Thinking	OEC	3	0	0	3	3
6.	MF3003	Reverse Engineering	OEC	3	0	0	3	3
7.	OPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
8.	AU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
9.	OAS352	Space Engineering	OEC	3	0	0	3	3
10.	OIM351	Industrial Management	OEC	3	0	0	3	3
11.	OIE354	Quality Engineering	OEC	3	0	0	3	3
12.	OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
13.	OML351	Introduction to Non-destructive Testing	OEC	3	0	0	3	3
14.	OMR351	Mechatronics	OEC	3	0	0	3	3
15.	ORA351	Foundation of Robotics	OEC	3	0	0	3	3
16.	OAE352	Fundamentals of Aeronautical Engineering	OEC	3	0	0	3	3
17.	OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18.	OAI351	Urban Agriculture	OEC	3	0	0	3	3
19.	OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20.	OEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
21.	OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22.	OCH351	Nano Technology	OEC	3	0	0	3	3
23.	OCH352	Functional Materials	OEC	3	0	0	3	3
24.	OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
25.	OFD353	Introduction to food processing	OEC	3	0	0	3	3
26.	OPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
27.	OTT351	Basics of Textile Finishing	OEC	3	0	0	3	3
28.	OTT352	Industrial Engineering for Garment Industry	OEC	3	0	0	3	3
29.	OTT353	Basics of Textile Manufacture	OEC	3	0	0	3	3
30.	OPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
31.	CPE334	Energy Conservation and Management	OEC	3	0	0	3	3
32.	OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3
33.	OEC351	Signals and Systems	OEC	3	0	0	3	3
34.	OEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
35.	CBM348	Foundation Skills in Integrated Product Development	OEC	3	0	0	3	3

36.	CBM333	Assistive Technology	OEC	3	0	0	3	3
37.	OMA352	Operations Research	OEC	3	0	0	3	3
38.	OMA353	Algebra and Number Theory	OEC	3	0	0	3	3
39.	OMA354	Linear Algebra	OEC	3	0	0	3	3
40.	OCE353	Lean Concepts, Tools and Practices	OEC	3	0	0	3	3
41.	OBT352	Basics of Microbial Technology	OEC	3	0	0	3	3
42.	OBT353	Basics of Biomolecules	OEC	3	0	0	3	3
43.	OBT354	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3	3

#### OPEN ELECTIVES – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	OHS352	Project Report Writing	OEC	3	0	0	3	3
2.	OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
3.	OMA356	Random Processes	OEC	3	0	0	3	3
4.	OMA357	Queuing and Reliability Modelling	OEC	3	0	0	3	3
5.	OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3
6.	OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3
7.	OME352	Additive Manufacturing	OEC	3	0	0	3	3
8.	CME343	New Product Development	OEC	3	0	0	3	3
9.	OME355	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3
10.	MF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
11.	OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
12.	AU3002	Batteries and Management system	OEC	3	0	0	3	3
13.	AU3008	Sensors and Actuators	OEC	3	0	0	3	3
14.	OAS353	Space Vehicles	OEC	3	0	0	3	3
15.	OIM352	Management Science	OEC	3	0	0	3	3
16.	OIM353	Production Planning and Control	OEC	3	0	0	3	3
17.	OIE353	Operations Management	OEC	3	0	0	3	3
18.	OSF352	Industrial Hygiene	OEC	3	0	0	3	3

19.	OSF353	Chemical Process Safety	OEC	3	0	0	3	3
20.	OML352	Electrical, Electronic and Magnetic materials	OEC	3	0	0	3	3
21.	OML353	Nanomaterials and Applications	OEC	3	0	0	3	3
22.	OMR352	Hydraulics and Pneumatics	OEC	3	0	0	3	3
23.	OMR353	Sensors	OEC	3	0	0	3	3
24.	ORA352	Concepts in Mobile Robots	OEC	3	0	0	3	3
25.	MV3501	Marine Propulsion	OEC	3	0	0	3	3
26.	OMV351	Marine Merchant Vessels	OEC	3	0	0	3	3
27.	OMV352	Elements of Marine Engineering	OEC	3	0	0	3	3
28.	CRA332	Drone Technologies	OEC	3	0	0	3	3
29.	OGI352	Geographical Information System	OEC	3	0	0	3	3
30.	OAI352	Agriculture Entrepreneurship Development	OEC	3	0	0	3	3
31.	OEN352	Biodiversity Conservation	OEC	3	0	0	3	3
32.	OEE353	Introduction to control systems	OEC	3	0	0	3	3
33.	OEI354	Introduction to Industrial Automation Systems	OEC	3	0	0	3	3
34.	OCH353	Energy Technology	OEC	3	0	0	3	3
35.	OCH354	Surface Science	OEC	3	0	0	3	3
36.	OFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3
37.	OFD355	Food safety and Quality Regulations	OEC	3	0	0	3	3
38.	OPY353	Nutraceuticals	OEC	3	0	0	3	3
39.	OTT354	Basics of Dyeing and Printing	OEC	3	0	0	3	3
40.	FT3201	Fibre Science	OEC	3	0	0	3	3
41.	OTT355	Garment Manufacturing Technology	OEC	3	0	0	3	3
42.	OPE353	Industrial safety	OEC	3	0	0	3	3
43.	OPE354	Unit Operations in Petro Chemical Industries	OEC	3	0	0	3	3
44.	OPT352	Plastic Materials for Engineers	OEC	3	0	0	3	3
45.	OPT353	Properties and Testing of Plastics	OEC	3	0	0	3	3
46.	OEC353	VLSI Design	OEC	3	0	0	3	3
47.	CBM370	Wearable Devices	OEC	3	0	0	3	3
48.	CBM356	Medical Informatics	OEC	3	0	0	3	3
49.	OCE354	Basics of Integrated Water	OEC	3	0	0	3	3

		Resources Management						
50.	OBT355	Biotechnology for Waste Management	OEC	3	0	0	3	3
51.	OBT356	Lifestyle Diseases	OEC	3	0	0	3	3
52.	OBT357	Biotechnology in Health Care	OEC	3	0	0	3	3

### SUMMARY

Name of the Programme: B.Tech. Computer Science and Business Systems										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	4	3					5		12
2	BSC	12	7	4	6					29
3	ESC	5	9	4						18
4	PCC		5	16	18	10	9			58
5	PEC					6	12			18
6	OEC						3	9		12
7	EEC	1	2	1		2			10	16
8	Non-Credit / (Mandatory)					√	√			
<b>Total</b>		<b>22</b>	<b>26</b>	<b>25</b>	<b>24</b>	<b>18</b>	<b>24</b>	<b>14</b>	<b>10</b>	<b>163</b>

### ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Complete details are available in clause 4.10 (Amendments) of Regulations 2021.



**VERTICALS FOR MINOR DEGREE**  
**(In addition to all the verticals of other programmes)**

<b>Vertical I Fintech and Block Chain</b>	<b>Vertical II Entrepreneurship</b>	<b>Vertical III Public Administration</b>	<b>Vertical IV Business Data Analytics</b>	<b>Vertical V Environment and Sustainability</b>
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable Infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management For Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

PROGRESS THROUGH KNOWLEDGE



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(choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

**VERTICAL 1: FINTECH AND BLOCK CHAIN**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG331	Financial Management	PEC	3	0	0	3	3
2.	CMG332	Fundamentals of Investment	PEC	3	0	0	3	3
3.	CMG333	Banking, Financial Services and Insurance	PEC	3	0	0	3	3
4.	CMG334	Introduction to Blockchain and its Applications	PEC	3	0	0	3	3
5.	CMG335	Fintech Personal Finance and Payments	PEC	3	0	0	3	3
6.	CMG336	Introduction to Fintech	PEC	3	0	0	3	3

**VERTICAL 2: ENTREPRENEURSHIP**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG337	Foundations of Entrepreneurship	PEC	3	0	0	3	3
2.	CMG338	Team Building & Leadership Management for Business	PEC	3	0	0	3	3
3.	CMG339	Creativity & Innovation in Entrepreneurship	PEC	3	0	0	3	3
4.	CMG340	Principles of Marketing Management for Business	PEC	3	0	0	3	3
5.	CMG341	Human Resource Management for Entrepreneurs	PEC	3	0	0	3	3
6.	CMG342	Financing New Business Ventures	PEC	3	0	0	3	3

**VERTICAL 3: PUBLIC ADMINISTRATION**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG343	Principles of Public Administration	PEC	3	0	0	3	3
2.	CMG344	Constitution of India	PEC	3	0	0	3	3
3.	CMG345	Public Personnel Administration	PEC	3	0	0	3	3
4.	CMG346	Administrative Theories	PEC	3	0	0	3	3
5.	CMG347	Indian Administrative System	PEC	3	0	0	3	3
6.	CMG348	Public Policy Administration	PEC	3	0	0	3	3

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**VERTICAL 4: BUSINESS DATA ANALYTICS**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG349	Statistics for Management	PEC	3	0	0	3	3
2.	CMG350	Datamining for Business Intelligence	PEC	3	0	0	3	3
3.	CMG351	Human Resource Analytics	PEC	3	0	0	3	3
4.	CMG352	Marketing and Social Media Web Analytics	PEC	3	0	0	3	3
5.	CMG353	Operation and Supply Chain Analytics	PEC	3	0	0	3	3
6.	CMG354	Financial Analytics	PEC	3	0	0	3	3

**VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CES331	Sustainable Infrastructure Development	PEC	3	0	0	3	3
2.	CES332	Sustainable Agriculture and Environmental Management	PEC	3	0	0	3	3
3.	CES333	Sustainable Bio Materials	PEC	3	0	0	3	3
4.	CES334	Materials for Energy Sustainability	PEC	3	0	0	3	3
5.	CES335	Green Technology	PEC	3	0	0	3	3
6.	CES336	Environmental Quality Monitoring and Analysis	PEC	3	0	0	3	3
7.	CES337	Integrated Energy Planning for Sustainable Development	PEC	3	0	0	3	3
8.	CES338	Energy Efficiency for Sustainable Development	PEC	3	0	0	3	3



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