CMR UNIVERSITY
Private University Estd in Karnataka State by Act No.45 of 2013
BENGALURU
RECOGNISED BY **UGC**

SCHOOL OF ENGINEERING & TECHNOLOGY (SOET)

BACHELOR OF TECHNOLOGY (B.Tech.)
PROGRAMME STRUCTURE-2023

B.Tech. CSE Data Science

I Semester (Physics Cycle)

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/ Week	Credit Distribution L-T-P-C
Program Core						
Engineering Mathematics I	Foundation	FC	BSC	BS	4	3-1-0-4
Engineering Physics	Foundation	FC	BSC	BS	5	3-0-1-4
Elements of Electrical & Electronics Engineering	Foundation	FC	ESC	ECE	4	3-1-0-4
Elements of Computer Engineering	Foundation	FC	ESC	CSE	3	3-0-0-3
Computer Aided Engineering Drawing	Foundation	FC	ESC	ME	5	1-0-2-3
Common Core						
Design Thinking-1	PS	-	HSMC	DCCC	(30)	0-0-2-2
Oral and Written Communication	PS	-	HSMC	DCCC	4	4-0-0-4
Community Service -I (COS - I) *	CS	-	SDC	DCCC	(30)	0-0-1-1*
TOTAL					29	24 + 1*
Audit Course						
		-				
Common Core (Non-Credit) - Graduate Requirement: Nil						

The Community Service-I (COS-I) of 30 hours has to be carried out in the I Semester. The corresponding 1 credit and the CIE will be reflected in the VIII Semester.

II Semester (Physics Cycle)

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/ Week	Credit Distribution L-T-P-C
Program Core						
Engineering Mathematics II	Foundation	FC	BSC	BS	4	3-1-0-4
Engineering Chemistry	Foundation	FC	BSC	BS	3	1-0-1-2
Elements of Mechanical Engineering and Workshop	Foundation	FC	ESC	ME	4	2-0-1-3
Elements of Civil Engineering	Foundation	FC	ESC	CE	3	2-1-0-3
Problem solving using Python (MOOC)	Foundation	FC	ESC	CSE	4	2-0-1-3
Common Core						
Design Thinking -2	PS	-	HSMC	DCCC	(30)	0-0-2-2
Kan/Eng/Hin/FL	PS	-	HSMC	DCCC	2	2-0-0-2
Community Service - II (COS - II) *	CS	-	SDC	DCCC	(30)	0-0-1-1*
TOTAL					24	19 + 1*
Audit Course						
		-				
Common Core (Non-Credit) - Graduate Requirement: **GPSDR1081: Personal Effectiveness**						

† Internship- I of 3 credits to be carried out between II and III Semester break. The corresponding 3 credits will be reflected in the VIII Semester.

*The Community Service-II (COS-II) of 30 hours has to be carried out in the II Semester. The corresponding 1 credit and the CIE will be reflected in the VIII Semester.

I Semester (Chemistry Cycle)

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/ Week	Credit Distribution L-T-P-C
Program Core						
Engineering Mathematics I	Foundation	FC	BSC	BS	4	3-1-0-4
Engineering Chemistry	Foundation	FC	BSC	BS	3	1-0-1-2
Elements of Mechanical Engineering and Workshop	Foundation	FC	ESC	ME	4	2-0-1-3
Elements of Civil Engineering	Foundation	FC	ESC	CE	3	2-1-0-3
Problem solving using Python (MOOC)	Foundation	FC	ESC	CSE	4	2-0-1-3
Common Core						
Design Thinking -1	PS	-	HSMC	DCCC	(30)	0-0-2-2
Kan/Eng/Hin/FL	PS	-	HSMC	DCCC	2	2-0-0-2
Community Service - I (COS - I) *	CS	-	SDC	DCCC	(30)	0-0-1-1 *
TOTAL					26	19 + 1*
Audit Course						
		-				
Common Core (Non-Credit) - Graduate Requirement: Nil						

The Community Service-I (COS-I) of 30 hours has to be carried out in the I Semester. The corresponding 1 credit and the CIE will be reflected in the VIII Semester.

II Semester (Chemistry Cycle)

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/ Week	Credit Distribution L-T-P-C
Program Core						
Engineering Mathematics II	Foundation	FC	BSC	BS	4	3-1-0-4
Engineering Physics	Foundation	FC	BSC	BS	5	3-0-1-4
Elements of Electrical & Electronics Engineering	Foundation	FC	ESC	EE	4	3-1-0-4
Elements of Computer Engineering	Foundation	FC	ESC	CSE	3	3-0-0-3
Computer Aided Engineering Drawing	Foundation	FC	ESC	ME	5	1-0-2-3
Common Core						
Design Thinking-2	PS	-	HSMC	DCCC	(30)	0-0-2-2
Community Service - II (COS - II)	CS	-		DCCC	(30)	0-0-1-1*
Oral and Written Communication	PS	-	HSMC	DCCC	4	4-0-0-4
TOTAL					**27**	**24 + 1***
Audit Course						
		-				
Common Core (Non-Credit) - Graduate Requirement: **GPSDR1081: Personal Effectiveness**						

† Internship- I of 3 credits to be carried out between II and III Semester break. The corresponding 3 credits will be reflected in the VIII Semester.

*The Community Service-II (COS-II) of 30 hours has to be carried out in the II Semester. The corresponding 1 credit and the CIE will be reflected in the VIII Semester.

III Semester

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core						
Discrete Mathematical Structures and Applications	Foundation	FC	PCC	BS	4	3-1-0-4
Problem solving and programming using C	Foundation	FC	PCC	BS	3	1-0-1-2
Data Structures	Foundation	FC	PCC	CSE	4	2-0-1-3
Introduction to Artificial Intelligence	Foundation	FC	PCC	CSE	3	3-0-0-3
Web Development using Python and Django (P) (MOOC)	Foundation	FC	PCC	CSE	4	2-0-1-3
	Foundation	Internship- I*	PROJ	CSE		
Common Core						
Indian Constitution	KSC	-	MC	DCCC	2	2-0-0-2
Arts & Philosophy	KSC	-	MC	DCCC	1	1-0-0-1
Community Service –III (COS - III)	CS	-	SDC	DCCC	(30)	0-0-1-1*
TOTAL					**22**	**18 + 1***
Audit Course						
		-				
Graduate Requirement						
Common Core (Non-Credit) - Graduate Requirement: GPSBD1171- GPSBA1081 - Career Preparedness Program-I (Career essentials + Prepare for Aptitude Tests-I)						

† Internship - I credits are reflected in the VIII Semester.

*The Community Service-III (COS-III) of 30 hours has to be carried out in the III Semester. The corresponding 1 credit and the CIE will be reflected in the VIII Semester.

IV Semester

Course		CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core							
Mathematics IV		Foundation	FC	BSC	BS	4	3-1-0-4
Python for Data Science (P) (MOOC)		Foundation	FC	PCC	CSE	4	2-0-1-3
Database Management Systems		Foundation	FC	PCC	CSE	4	2-0-1-3
Data Visualization		Foundation	FC	PCC	CSE	3	3-0-0-3
Making with Electronics		PS	-	ESC	ECE	5	1-0-2-3
Common Core							
	Critical Inquiry	PS	-	SDC	DCCC	1	1-0-0-1
	Community Service –IV (COS - IV) *	CS	-	SDC	DCCC	(30)	0-0-1-1*
TOTAL						**22**	**17 + 1***
Audit Course							Critical Inquiry
			-				
Graduate Requirement							
Common Core (Non-Credit) - Graduate Requirement: **GPSBD1191 - GPSBA1091 - Career Preparedness Program-II (Career Readiness + Prepare for Aptitude Tests-II)**							

V Semester

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core						
Operating Systems for DS	Foundation	FC	PCC	CSE	3	3-0-0-3
No-SQL Databases	Foundation	FC	PCC	CSE	4	2-0-1-3
Big Data Analytics	Foundation	FC	PCC	CSE	4	2-0-1-3
Open Elective 1	Elective	IC	OEC	N/A	3	3-0-0-3
Professional Elective 1	Elective	IC	PEC	CSE	3	x-x-x-3
	Interdisciplinary Elective1	IDE	OEC		3	x-x-x-3
	Foundation	Internship-II* (4th - 5th Break)	PROJ	CSE		
Common Core						
Environment and Sustainability	KSC	-	HSMC	Civil	2	2-0-0-2
TOTAL					22	20
Audit Course						
		-				
Graduate Requirement						
Common Core (Non-Credit) - Graduate Requirement: GPSBA1101 - Prepare for Aptitude Tests - III [†]						

PROFESSIONAL ELECTIVE–1: ARTIFICIAL INTELLIGENCE
Digital Image Processing (MOOC)
Data Mining for AI (MOOC)
R Language (MOOC)

PROFESSIONAL ELECTIVE–1: CYBER SECURITY
Cryptography (MOOC)
Software Security (MOOC)
Secure Coding

PROFESSIONAL ELECTIVE–1: APPLICATION DEVELOPMENT
Advanced Java
Scripting Languages (MOOC)
Kotlin (OO+Functional)(MOOC)

PROFESSIONAL ELECTIVE–1: NETWORKING
Network programming in Unix & C (MOOC)
Python for Networking (MOOC)
Client-Server Technologies

OPEN ELECTIVE–1
Object Oriented Programming
Database Management Systems
Office Automation (MOOC)

VI Semester

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core						
Data Communication & Computer Networks	Foundation	FC	PCC	CSE	4	2-0-1-3
Introduction to Machine Learning	Foundation	FC	PCC	CSE	4	2-0-1-3
Software Engineering for DS	Foundation	FC	PCC	CSE	3	3-0-0-3

Open Elective 2	Elective	IC	OEC		3	3-0-0-3
Professional Elective 2	Elective	IC	PEC	CSE	3	x-x-x-3
	Interdisciplinary Elective 2	IDE	OEC		3	x-x-x-3
Common Core						
Sociology of globalization and sustainable development	CS	-	HSMC	DCCC	2	2-0-0-2
TOTAL					**22**	**20**
Audit Course						
		-				
Graduate Requirement						
Common Core (Non-Credit) - Graduate Requirement: **GPSBA1111 - GPSBD1201 - Career Preparedness Program-III (Career Insights + Prepare for Aptitude Tests-IV)**						

† Internship- III of 3 credits to be carried out between VI and VII Semester break. The corresponding 3 credits will be reflected in the VIII Semester.

PROFESSIONAL ELECTIVE–2: ARTIFICIAL INTELLIGENCE	
4AIML3131	Advanced Python for Artificial Intelligence (MOOC)
4AIML2081	Recommender System (MOOC)
4AIML3151	Introduction to Pattern Recognition
4CSDS2071	Multivariate Statistical Analysis (MOOC)

PROFESSIONAL ELECTIVE–2: CYBER SECURITY	
4CSGC3131	System Security
4CSGC3141	Ethical Hacking (MOOC)
4CSGC3151	Malware analysis (MOOC)

PROFESSIONAL ELECTIVE–2: APPLICATION DEVELOPMENT	
4CSPL3111	Object Oriented Analysis Design
4CSPL3121	Web Technology Frameworks (MOOC)
4CSPL3131	Application Development using MERN Stack (MOOC)

<table>
<tr><td colspan="2">PROFESSIONAL ELECTIVE–2: NETWORKING</td></tr>
<tr><td>4CSPL3141</td><td>Advanced Computer Networks</td></tr>
<tr><td>4CSGC3161</td><td>Wireless Technologies (MOOC)</td></tr>
<tr><td>4CSGC3171</td><td>Multimedia Networking (MOOC)</td></tr>
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OPEN ELECTIVE–2	
4CSPL2071	Web Technology (MOOC)
4CSPL2051	Mobile Application Development (MOOC)
4CSGC2101	Machine Learning for Beginners

VII Semester

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core						
Chat Bot Development	Foundation	AC	PCC	CSE	4	2-0-1-3
Time Series Analysis	Foundation	AC	PCC	CSE	3	3-0-0-3
Deep Learning	Foundation	AC	PCC	CSE	4	2-0-1-3
Professional Elective 3	Elective	AC	PEC	CSE	3	x-x-x-3
Professional Elective 4	Elective	AC	PEC	CSE	3	x-x-x-3
Business Management for Engineers	PS	-	HSMC	DCCC	1	1-0-0-1
	Inter disciplinary Elective 3	IDE	OEC		3	x-x-x-3
	Foundation	Capstone Project Phase I	PROJ	CSE		
	Foundation	Internship-III*	PROJ	CSE		
Common Core						
Ethics & Values	KSC	-	HSMC	DCCC	2	2-0-0-2
TOTAL					23	21
Audit Course						

			-				
Graduate Requirement							
Common Core (Non-Credit) - Graduate Requirement: **GPSDL1061 - Career Advancement**							

† Internship - III credits are reflected in the VIII Semester.

PROFESSIONAL ELECTIVE–3,4: ARTIFICIAL INTELLIGENCE	
4AIML4021	Genetic Algorithm (MOOC)
4AIML4031	Introduction to Computer Vision
4AIML4041	Robotic Process Automation for AI (MOOC)
4AIML4051	Soft Computing (MOOC)

PROFESSIONAL ELECTIVE–3,4: CYBER SECURITY	
4CSPL4061	Mobile Computing Security (MOOC)
4CSPL4071	Digital Forensics (MOOC)
4CSPL4081	Cloud Computing Security (MOOC)
4CSPL4091	Web Security

PROFESSIONAL ELECTIVE–3,4: APPLICATION DEVELOPMENT	
4CSPL4101	J2EE Technologies (MOOC)
4CSPL4111	.NET Technologies (MOOC)
4CSPL4121	JavaScript
4CSPL4131	Microservices (MOOC)

PROFESSIONAL ELECTIVE–3,4: NETWORKING	
4CSPL4141	Software Defined Networks
4CSPL4151	Storage Area Networks (MOOC)
4CSPL4161	Virtualization & Cloud Computing (MOOC)
4CSPL4171	Network Administration (MOOC)

VIII Semester

Course	CMRU Category	CMRU Subcategory	AICTE Category	School/ Department	Contact Hours/Week	Credit Distribution L-T-P-C
Program Core						
Capstone Project Phase II	Foundation	Capstone	PCC	CSE	-	x-x-x-8
Internship- I*	Foundation	Internship	PCC	CSE	-	x-x-x-3

Internship- II*	Foundation	Internship	PCC	CSE	-	x-x-x-3
Internship- III*	Foundation	Internship	PCC	CSE	-	x-x-x-3
Community Service -I (COS - I) *	CS	-	SDC	DCCC	(30)	0-0-1-1
Community Service -II (COS - II) *	CS	-	SDC	DCCC	(30)	0-0-1-1
Community Service -III (COS - III) *	CS	-	SDC	DCCC	(30)	0-0-1-1
Community Service -IV (COS - IV) *	CS	-	SDC	DCCC	(30)	0-0-1-1
TOTAL						**21**
Audit Course						
		-				
Common Core (Non-Credit) - Graduate Requirement: Career Preparedness Courses [†] + Community Service [††]						

† The credits of Internship - I taken up after the II Semester is reflected in the VIII Semester
†† The credits of Internship - II taken up after the IV Semester is reflected in the VIII Semester

*††† The credits of Internship - III taken up after the VI Semester is reflected in the VIII Semester * The credit of Community Service - I (COS-I) / Community Service - II (COS-II) / Community Service - III (COS-III) / Community Service - IV(COS-IV) of 30 hours each that was carried out in the I / II / III and IV Semesters respectively is reflected in the VIII Semester.*