CMR UNIVERSITY
Private University Estd in Karnataka State by Act No. 45 of 2013

# SCHOOL OF ENGINEERING AND TECHNOLOGY

# Bachelor of Technology

# in

# Artificial Intelligence and Data Science

# Regulations

# and

# Scheme of Teaching and Evaluation

## (Batch: 2026-2030)
## (July, 2026)

Main Campus: Off Hennur-Bagalur Main Road, Chagalatti, Bengaluru – 562 149
City Office: #2, 2nd Block, HRBR Layout, Kalyananagar, Bengaluru – 560 043
Ph: 080-25426977/6988/7700, Fax: 080-25427840
e-mail: info@cmr.edu.in, Web: www.cmr.edu.in

## Vision and Mission – CMRU

### Vision

To nurture creative thinkers who will drive positive global change

### Mission

- To offer multi, inter and cross-disciplinary modular programmes with technology-enabled Teaching-Learning processes.
- To focus on research-led teaching and learning in an innovative and interdisciplinary learning environment; to create critical thinkers
- To create leaders for a knowledge-based economy, with ethical demands of a society base
- To engage talented intellectual capital with strong faculty diversity in knowledge and experience
- To ensure transformation of learning into positive behavior of students

## Vision and Mission – School of Engineering and Technology

### Vision

To educate students who will advance society by seeking continuous innovation in science, technology and research

### Mission

- ❖ To offer interdisciplinary, technology-lead, project-based programmes to create innovative, ethical and responsible technocrats
- ❖ To promote collaborative research focused learning environment that develops highly intellectual, creative thinkers committed to delivering techno-economic solutions
- ❖ Sensitize students to the global problems of environment, sustainability and growth, to create a better world and long-lasting impact.

## Programme Educational Objectives

| | |
|---|---|
| **PEO1** | To prepare graduates as leading professionals globally in government, academia, corporate and research organizations along with entrepreneurial pursuits |
| **PEO2** | To prepare graduates with an ability to articulate and solve problems in the field of Computer Science and Engineering with Artificial Intelligence and Data Science approach |
| **PEO3** | To prepare the graduates with strong learning quotients having adaptability to the constantly changing technological environment |
| **PEO4** | To prepare the graduates to lead and initiate ethically the professional and organizational goals in interdisciplinary team and obtain desired results. |

## Programme Outcomes (POs)

| | |
|---|---|
| **PO1** | **Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex Artificial Intelligence and Data Science engineering problems. |
| **PO2** | **Problem Analysis:** Identify, formulate, review research literature and analyze complex Artificial Intelligence and Data Science engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. |
| **PO3** | **Design / Development of Solutions:** Design solutions for complex Artificial Intelligence and Data Science engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, 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** | **Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex Artificial Intelligence and Data Science engineering activities with an understanding of the limitations. |
| **PO6** | **Engineering 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 in Artificial Intelligence and Data Science Engineering. |
| **PO7** | **Environment and sustainability:** Understand the impact of the professional engineering solutions in Artificial Intelligence and Data Science engineering in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| **PO8** | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. |
| **P09** | **Individual and Team Work:** Function effectively as an individual and as a member or leader to diverse teams, and in multidisciplinary settings. |
| **P10** | **Communication:** Communicate effectively on complex Artificial Intelligence and Data Science engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective report and design documentation, make effective presentations, and give and receive clear instructions. |
| **P11** | **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. |
| **P12** | **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. |

## Program Specific Outcomes (PSOs)

**At the end of the program, the student will be able to**

| | |
|---|---|
| **PSO1** | Apply foundational concepts of mathematics, statistics, programming, machine learning, and data analytics to design and implement AI and data-driven solutions for engineering problems. |
| **PSO2** | Develop, test, and deploy intelligent systems and data-centric applications using modern tools, frameworks, cloud platforms, and software engineering practices. |
| **PSO3** | Demonstrate the ability to use AI and data responsibly by addressing ethical considerations, data privacy, security, and sustainability while contributing effectively to multidisciplinary teams and societal needs. |

| PO<br>Mission | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 3 |
| M2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| M3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

## Scheme of Teaching and Evaluation (STE)

## Batch [2026-30]

### Credit Structure (Physics Cycle)

| Sl. No | Category | I Sem | II Sem | III Sem | IV Sem | V Sem | VI Sem | VII Sem | VIII Sem | Total | % of Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Common Core | 6 | 3 | 3 | 2 | 4 | 4 | 0 | 4 | 26 | 15 |
| 2 | Foundation Courses (Fundamental/ Intermediate/ Advanced) | 17 | 16 | 20 | 18 | 9 | 6 | 6 | | 92 | 59 |
| 3 | Internships | | | | | | | | 9 | 9 | 5 |
| 4 | Capstone Project/ Dissertation | | | | | | | | 8 | 8 | 5 |
| 5 | Electives - General | | | | | 3 | 3 | | | 6 | 3 |
| 6 | Electives- Specialization | | | | | 3 | 3 | 6 | | 12 | 8 |
| 7 | Interdisciplinary | | | | | 3 | 3 | 3 | | 9 | 5 |
| | Total | 23 | 19 | 23 | 20 | 22 | 19 | 15 | 21 | 162 | 100 |

**Credit Structure (Chemistry Cycle)**

| Sl. No | Category | I Sem | II Sem | III Sem | IV Sem | V Sem | VI Sem | VII Sem | VIII Sem | Total | % of Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Common Core | 3 | 6 | 3 | 2 | 4 | 4 | 0 | 4 | 26 | 15 |
| 2 | Foundation Courses ( Fundamental/ Intermediate/ Advanced) | 16 | 17 | 20 | 18 | 9 | 6 | 6 | | 92 | 59 |
| 3 | Internships | | | | | | | | 9 | 9 | 5 |
| 4 | Capstone Project/ Dissertation | | | | | | | | 8 | 8 | 5 |
| 5 | Electives - General | | | | | 3 | 3 | | | 6 | 3 |
| 6 | Electives-Specialisation | | | | | 3 | 3 | 6 | | 12 | 8 |
| 7 | Interdisciplinary | | | | | 3 | 3 | 3 | | 9 | 5 |
| | Total | 19 | 23 | 23 | 20 | 22 | 19 | 15 | 21 | 162 | 100 |

**Programme Structure**

| LEGEND | |
|---|---|
| **AICTE** | |
| BSC | Basic Science Course |
| ESC | Engineering Science Course |
| HSMC | Humanities and Social Sciences including Management Courses |
| PCC | Professional Core Course |
| PEC | Professional Elective Course |
| OEC | Open Elective Course |

| | |
|---|---|
| LC | Laboratory Course |
| MC | Mandatory Course |
| SDC | Skill Development Course |
| PROJ | Project, Seminar and Internship in industry |
| **CMRU** | |
| FC | Fundamental Course |
| IC | Intermediate Course |
| AC | Advanced Course |
| IDE | Interdisciplinary Elective |
| **Common Core Courses** | |
| PS | Preparing for Success |
| KSC | Knowing Self & Community |
| CS | Contributing to Society |
| **SOET Departments** | |
| BS | Basic Sciences |
| EE | Electrical Engineering |
| CSE | Computer Science Engineering |
| AIML | CSE (Artificial Intelligence and Machine learning) |
| AIDS | Artificial Intelligence and Data Science |
| DS | CSE (Data Science) |
| ME | Mechanical Engineering |
| CE | Civil Engineering |
| ECE | Electronics and Communication Engineering |

## COURSE CODE DESCRIPTION:

**aXXXXbccd:**

**a** - School Code Number

1 - School of Education (SOE)
2 - School of Architecture (SOA)
3 - School of Economics & Commerce (SOEC)
4 - School of Engineering & Technology (SOET)
5 - School of Legal Studies (SOLS)
6 - School of Management (SOM)
7 - School of Social Sciences & Humanities (SOSSH)
8 - School of Science Studies (SOSS)
9 - School of Design (SOD)

C - Department of Common Core Curriculum (DCCC)

**XXXX** - Discipline Code

**b** - Level Number

**cc -** Course Number

**d** - Syllabus Version Number

**DISCIPLINE CODE:**

| **Discipline** | **Code** |
|---|---|
| Mathematics | MATH |
| Physics | PHYS |
| Chemistry | CHEM |
| Electrical Engineering | ENEE |
| Computer Science General Course | CSGC |
| Artificial Intelligence and Machine Learning | AIML |
| AM (Artificial Intelligence and Machine Learning) Practical Lab | AMPL |
| AIDS(Artificial Intelligence and Data Science) | AIDS |
| Computer Science and Data Science | CSDS |
| Mechanical Engineering | ENME |
| Civil Engineering | ENCV |
| Computer Science Programming Language | CSPL |
| Electronics and Communication Engineering | ENCE |
| Internship | INTS |
| Capstone | CAPS |

## COMMON CORE DISCIPLINE CODE:

| DISCIPLINE | CODE |
|---|---|
| Contributing to Society - Humanities, Social Science and Management | CSHS |
| Knowing Self & Community - Humanities, Social Science and Management - Me, My Country, My World | KSHM |
| Knowing Self & Community - Mandatory Course - Arts and Philosophy | KSMA |
| Knowing Self & Community - Mandatory Course - Me, My Country, My World | KSMM |
| Preparing for Success - Engineering Sciences | PSES |
| Preparing for Success - Humanities, Social Science and Management - Design Thinking | PSHD |
| Preparing for Success - Humanities, Social Science and Management | PSHS |
| Preparing for Success - Humanities, Social Science and Management - Language | PSHL |
| Preparing for Success - Skill Development Course | PSSD |
| Preparing for Success - Skill Enhancement Course - Foreign Language | PSSF |
| Preparing for Success - Skill Enhancement Course - NCC | PSSN |

## CREDIT DISTRIBUTION:

**L-T-P-C :**

**L** - Lecture
**T** - Tutorial
**P** - Practical
**C** - Credit (Total)

## I Semester (Physics Cycle)

| Course Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/ Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH1012 | Engineering Mathematics with Python Lab - I | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4PHYS1013 | Engineering Physics | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4ENEE1012 | Fundamentals of Electrical Engineering | Foundation | FC | ESC | ECE | 3 | 3-0-0-3 |
| 4CSGC1012 | Elements of Computer Engineering | Foundation | FC | ESC | CSE | 2 | 2-0-0-2 |
| 4CSPL1113 | Programming in C | Foundation | FC | ESC | ME | 6 | 2-0-2-4 |
| **Common Core** | | | | | | | |
| CPSAL1062/71/82 | Hindi/Kannada/ English | PS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CPSAL1121 | Active Communication | PS | - | HSMC | DCCC | 3 | 3-0-0-3 |
| CPSSD1061 | Creating with AI | PS | - | HSMC | DCCC | 1 | 1-0-0-1 |
| CCSCD1011 | Community Service Programme - I | CPC | - | SDC | SOET | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **27** | **23 + 1*** |

*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 Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/ Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH1022 | Engineering Mathematics with Python Lab - II | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4CHEM1014 | Engineering Chemistry | Foundation | FC | BSC | BS | 3 | 1-0-1-2 |
| 4ENCE1012 | Fundamentals of Electronics Engineering | Foundation | FC | ESC | ME | 4 | 3-1-0-4 |
| 4ENCV1072 | Engineering Mechanics | Foundation | FC | ESC | CE | 2 | 2-0-0-2 |
| 4CSPL1012 | Problem solving using Python | Foundation | FC | ESC | CSE | 6 | 2-0-2-4 |
| **Common Core** | | | | | | | |
| CPSAD1013 | Design Thinking | PS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CPSDB1011 | Career Preparedness Program - I | PS | - | HSMC | DCCC | 2 | 0-0-1-1 |
| GCSCD1021 | Community Service -II (COS - II) | CS | - | SDC | SOET | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **24** | **19 + 1*** |

*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 Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/ Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH1012 | Engineering Mathematics with Python Lab - I | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4CHEM1014 | Engineering Chemistry | Foundation | FC | BSC | BS | 3 | 1-0-1-2 |
| 4ENCE1012 | Fundamentals of Electronics Engineering | Foundation | FC | ESC | ME | 4 | 3-1-0-4 |
| 4ENCV1072 | Engineering Mechanics | Foundation | FC | ESC | CE | 2 | 2-0-0-2 |
| 4CSPL1012 | Problem solving using Python | Foundation | FC | ESC | CSE | 6 | 2-0-2-4 |
| **Common Core** | | | | | | | |
| CPSAD1013 | Design Thinking | PS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CPSSD1061 | Creating with AI | PS | - | HSMC | DCCC | 1 | 1-0-0-1 |
| CCSCD1011 | Community Service -I (COS - I) | CS | - | SDC | SOET | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **23** | **19 + 1*** |

*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 Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/ Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH1022 | Engineering Mathematics with Python Lab - II | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4PHYS1013 | Engineering Physics | Foundation | FC | BSC | BS | 5 | 3-0-1-4 |
| 4ENEE1012 | Fundamentals of Electrical Engineering | Foundation | FC | ESC | ECE | 3 | 3-0-0-3 |
| 4CSGC1012 | Elements of Computer Engineering | Foundation | FC | ESC | CSE | 2 | 2-0-0-2 |
| 4CSPL1113 | Programming in C | Foundation | FC | ESC | CSE | 6 | 2-0-2-4 |
| **Common Core** | | | | | | | |
| CPSAL1062/71/82 | Hindi/Kannada/English | PS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CPSAL1121 | Active communication | PS | - | HSMC | DCCC | 3 | 3-0-0-3 |
| CPSDB1011 | Career Preparedness Program - I | PS | - | HSMC | DCCC | 2 | 0-0-1-1 |
| GCSCD1021 | Community Service Programme - II | CPC | - | SDC | DCCC | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **28** | **23+ 1*** |

*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 Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH2042 | Probability, Statistics and Numerical Methods | Foundation | FC | PCC | BS | 4 | 3-1-0-4 |
| 4CSPL2022 | Object Oriented Programming using Java | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4CSPL1022 | Data Structures | Foundation | FC | PCC | CSE | 5 | 3-0-1-4 |
| 4CSGC2092 | Computer Organization and Architecture | Foundation | IC | PCC | CSE | 3 | 3-0-0-3 |
| 4CSGC2082 | Software Engineering | Foundation | IC | PCC | CSE | 3 | 3-0-0-3 |
| CPSES1013 | Making with Electronics | PS | - | ESC | ECE | 5 | 1-0-2-3 |
| 4INTS3010 | Internship- I† | Foundation | - | PCC | CSE | 6 | 0-0-3-3† |
| **Common Core** | | | | | | | |
| CKSAM1051 | Indian Constitution | CC | - | SDC | DCCC | 2 | 2-0-0-2 |
| CPSBD1011 | Career Preparedness Program - II | PS | - | AECC | DCCC | 2 | 0-0-1-1 |
| CCSCD1031 | Community Service Programme -III | CS | | | SOET | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **30** | **23 + 1*+ 3†** |

† 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-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 Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4MATH2051 | Discrete Mathematics and Combinatorics | Foundation | FC | BSC | BS | 4 | 3-1-0-4 |
| 4CSGC2022 | Database Management Systems | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4CSGC2043 | Operating Systems | Foundation | IC | PCC | CSE | 3 | 3-0-0-3 |
| 4CSGC2053 | Design and Analysis of Algorithms | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4AIML1011 | Introduction to Artificial Intelligence | Foundation | FC | PCC | AIML | 2 | 2-0-0-2 |
| 4AIDS2011 | Data Visualization | Foundation | IC | PCC | CSE | 3 | 3-0-0-3 |
| **Common Core** | | | | | | | |
| CKSAA1033 | Introduction to Philosophical Thoughts | KSC | - | MC | DCCC | 1 | 1-0-0-1 |
| CPSDR1011 | Career Preparedness Programme - IV | KSC | - | MC | DCCC | 2 | 0-0-1-1 |
| CCSCD1041 | Community Service Programme -IV | CS | | | SOET | 2 | 0-0-1-1* |
| **TOTAL** | | | | | | **25** | **20 +1*** |

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

V Semester

| Course Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4AMPL2021 | Artificial Neural Networks | Intermediate | IC | PCC | AIML | 4 | 2-0-1-3 |
| 4CSPL3012 | Python for Data Science | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4AIML2022 | Computer Networks and Security | Foundation | IC | PCC | AIML | 3 | 3-0-0-3 |
| 4CSGC1XX1 | Open Elective 1 | Elective | IC | OEC | N/A | 3 | 3-0-0-3 |
| 4CSGC2XX1 | Professional Elective 1 | Elective | IC | PEC | CSE | 3 | 3-0-0-3 |
| | | Interdisciplinary Elective1 | IDE | OEC | | 3 | 3-0-0-3 |
| 4INTS3020 | Internship- II† | Foundation | Internship | PCC | CSE | 6 | 0-0-3-3† |
| **Common Core** | | | | | | | |
| CKSHA1011 | Indian Traditions: Values and Critical Inquiry | KSC | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CCSAE1011 | Disaster Management | KSC | - | HSMC | DCCC | 2 | 2-0-0-2 |
| **TOTAL** | | | | | | **24** | **22 + 3†** |
| | Training and Placement | PS | - | AECC | DCCC | 2 | GR |

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

| PROFESSIONAL ELECTIVE–1: ARTIFICIAL INTELLIGENCE | |
|---|---|
| 4CSPL3021 | Advanced Python for AI (MOOC) |
| 4AIML2331 | Foundation to Threat Intelligence |
| 4CSGC3231 | Creative AI and No-Code Automation |

| PROFESSIONAL ELECTIVE–1: DATA SCIENCE | |
|---|---|
| 4CSDS2052 | Introduction to Big Data Analytics |
| 4CSGC3081 | Data Mining |
| 4CSPL3031 | R Language(MOOC) |

| PROFESSIONAL ELECTIVE–1: APPLICATION DEVELOPMENT | |
|---|---|
| 4CSPL3041 | Advanced Java |
| 4CSPL3051 | Scripting Languages (MOOC) |
| 4CSPL3061 | Kotlin (OO+Functional)(MOOC) |

| PROFESSIONAL ELECTIVE–1: NETWORKING & CLOUD TECHNOLOGIES | |
|---|---|
| 4CSPL3071 | Network programming in Unix & C (MOOC) |
| 4AIML2411 | Cloud Computing |
| 4AIML2211 | Foundation to IoT |

| OPEN ELECTIVE–1 | |
|---|---|
| 4ENME2131 | Fundamentals of Robotics and Applications |
| 4ENCV2101 | Remote Sensing & Applications |
| 4ENCC1021 | Introduction to Digital Image Processing |

## VI Semester

| Course Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4CSPL3091 | No-SQL Databases | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4AMPL2041 | Natural language Processing | Intermediate | IC | PCC | AIML | 4 | 2-0-1-3 |
| 4CSGC1XX2 | Open Elective 2 | Elective | IC | OEC | N/A | 3 | 3-0-0-3 |
| 4CSGC2XX1 | Professional Elective 2 | Elective | IC | PEC | CSE | 3 | 3-0-0-3 |
| | | Interdisciplinary Elective 2 | IDE | OEC | | 3 | 3-0-0-3 |
| **Common Core** | | | | | | | |
| CKSAM1021 | Environment and Sustainability | CS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| CSSAE10XX | Contributing to Society (Elective) | CS | - | HSMC | DCCC | 2 | 2-0-0-2 |
| **TOTAL** | | | | | | **21** | **19** |
| | Training and Placement | PS | - | AECC | DCCC | 2 | GR |

| PROFESSIONAL ELECTIVE–2: ADVANCED COMPUTING | |
|---|---|
| 4CSGC3121 | Soft Computing (Fuzzy, Genetic, Ontologies) (MOOC) |
| 4CSGC2072 | Cloud Computing (MOOC) |
| 4CSPL3101 | Applied Machine Learning (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) |

| PROFESSIONAL ELECTIVE–2: NETWORKING | |
|---|---|
| 4CSPL3141 | Advanced Computer Networks |
| 4CSGC3161 | Wireless Technologies (MOOC) |
| 4CSGC3171 | Multimedia Networking (MOOC) |

| OPEN ELECTIVE–2 | |
|---|---|
| 4ENME2141 | Advanced Robotics: Integration of Control, Programming, and AI |
| 4ENCV2111 | Geographic Information System & Applications |
| 4ENCC1021 | Advance Digital Image Processing |

## VII Semester

| Course Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/ Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4CSPL2041 | Machine Learning | Foundation | IC | PCC | CSE | 4 | 2-0-1-3 |
| 4CSGC3XX1 | Professional Elective 3 | Elective | AC | PEC | CSE | 3 | 3-0-0-3 |
| 4CSGC3XX1 | Professional Elective 4 | Elective | AC | PEC | CSE | 3 | 3-0-0-3 |
| CPSHS1021 | Business Management for Engineers | PS | - | HSMC | SOM | 1 | 1-0-0-1 |
| | | Inter disciplinary Elective 3 | IDE | OEC | | 3 | 3-0-0-3 |
| 4CAPS4010 | Capstone Project Phase I | Foundation | Capstone Project Phase I | PROJ | CSE | 6 | |
| 4INTS4010 | Internship- III† | Foundation | Internship | PCC | CSE | 6 | 0-0-3-3† |
| **TOTAL** | | | | | | **14** | **13** + 3† |
| **Common Core** | | | | | | | |
| | Training and Placement | PS | - | AECC | DCCC | 2 | GR |

† 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–3,4: ARTIFICIAL INTELLIGENCE | |
|---|---|
| 4CSPL4021 | Deep Learning (MOOC) |
| 4CSPL4031 | Big Data and Analytics (MOOC) |
| 4CSPL4041 | Robotic Process Automation (MOOC) |
| 4CSPL4051 | Natural Language Processing |

| 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) |
| 4CSPL4141 | Software Defined Networks |
| 4CSPL4151 | Storage Area Networks (MOOC) |
| 4CSPL4161 | Virtualization & Cloud Computing (MOOC) |
| 4CSPL4171 | Network Administration (MOOC) |
| 4CSPL4111 | NET Technologies (MOOC) |
| 4CSPL4121 | JavaScript |
| 4CSPL4131 | Microservices (MOOC) |

## VIII Semester

| Course Code | Course | CMRU Category | CMRU Subcategory | AICTE Category | School/ Department | Contact Hours/Week | Credit Distribution L-T-P-C |
|---|---|---|---|---|---|---|---|
| **Program Core** | | | | | | | |
| 4CAPS4010 | Capstone Project Phase II | Foundation | Capstone | PCC | CSE | 16 | 0-0-8-8 |
| 4INTS3010 | Internship- I† | Foundation | Internship | PCC | CSE | - | 0-0-3-3 |
| 4INTS3020 | Internship- II† | Foundation | Internship | PCC | CSE | - | 0-0-3-3 |
| 4INTS4010 | Internship- III† | Foundation | Internship | PCC | CSE | - | 0-0-3-3 |
| CCSCD1011 | Community Service Programme – I* | CS | - | SDC | SOET | - | 0-0-1-1 |
| CCSCD1021 | Community Service Programme – II* | CS | - | SDC | SOET | - | 0-0-1-1 |
| CCSCD1031 | Community Service Programme – III* | CS | - | SDC | SOET | - | 0-0-1-1 |
| CCSCD1041 | Community Service Programme – III* | CS | - | SDC | SOET | - | 0-0-1-1 |
| **TOTAL** | | | | | | **16** | **21** |

† 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.

## INTERDISCIPLINARY ELECTIVE (IDE) COURSES:

| Course Code | School | Course Name | Semester |
|---|---|---|---|
| 6IDSS1011 | SOM | Introduction to Financial Management | Odd |
| 6IDSS1031 | SOM | Basics of Entrepreneurship | Odd |
| 6IDSS1051 | SOM | Finance for Non-Finance Students | Odd |
| 6IDSS1071 | SOM | Marketing - For the Uninitiated | Odd |
| 3IDSS1011 | SOEC | Accounting for Beginners | Odd |
| 3IDSS1031 | SOEC | Introduction to Taxation | Odd |
| 3IDSS1051 | SOEC | Personal Income Tax | Odd |
| 3IDSS1071 | SOEC | Financial Markets and Personal Investment | Odd |
| 8IDSS1011 | SOSS | Web designing | Odd |
| 8IDSS1031 | SOSS | Python Programming Basics | Odd |
| 8IDSS1051 | SOSS | Introduction to Media | Odd |
| 8IDSS1061 | SOSS | Media Technology | Odd |
| 5IDSS1011 | SOLS | Essentials of Human Rights and Public Interest Law | Odd |
| 7IDSS1021 | SOSSH | Personality & Development | Odd |
| 7IDSS1031 | SOSSH | Media & Cultural Studies | Odd |
| 7IDSS1051 | SOSSH | Mental Health at workplace | Odd |
| 7IDSS1071 | SOSSH | Positive Psychology | Odd |
| 2IDSS1011 | SOA | Exploration in Printmaking and Digital Fabrication | Odd |
| NIDSS1021 | | NCC I -2 | Odd |
| NIDSS1041 | | NCC I -4 | Odd |
| 6IDSS1021 | SOM | Human Resource Management - How it Really Works | Even |
| 6IDSS1041 | SOM | Introduction to Digital Marketing | Even |
| 6IDSS1061 | SOM | Entrepreneurship - A Primer | Even |
| 3IDSS1021 | SOEC | Fundamentals of Banking | Even |
| 3IDSS1041 | SOEC | Stock Market Operations | Even |

| | | | |
|---|---|---|---|
| 3IDSS1061 | SOEC | Financial Management | Even |
| 8IDSS1021 | SOSS | Structured Query Language (SQL) | Even |
| 8IDSS1041 | SOSS | Mobile App development | Even |
| 8IDSS1071 | SOSS | Media Psychology | Even |
| 8IDSS1081 | SOSS | Web Technology | Even |
| 5IDSS1021 | SOLS | Essential Laws for Business Enterprise | Even |
| 7IDSS1011 | SOSSH | Environmental Psychology | Even |
| 7IDSS1041 | SOSSH | Women Studies | Even |
| 7IDSS1061 | SOSSH | Community Psychology | Even |
| 7IDSS1081 | SOSSH | Youth Development | Even |
| NIDSS1011 | | NCC I - 1 | Even |
| NIDSS1031 | | NCC I - 3 | Even |

## CURRICULUM GLOSSARY

**Credit Distribution:** Allocation of credits under lecture (L), tutorials (T), and practicals (P) viz. L-T-P-C. Eg. A 4 credit course has a credit distribution as 3-0-1-4 implying 3 credits for lecture and 1 credit for practicals and total of 4 credits.

**Program Core (Credit Courses):**

Each academic programme is divided into mandatory and choice segments, with levels within them. Mandatory segments are those which lay a firm foundation of the knowledge required to complete a programme in the chosen domain, ending with a multifaceted assignment that serves as a culminating academic and intellectual experience for students, typically during their final year. Choice segments are those which a student could opt for to specialize further and / or to improve their interdisciplinary skills. All segments carry credits, and the students are expected to earn the minimum number of credits in their coursework towards program core during their academic programme. The Program Core courses are categorized as follows:

a. **Foundation:**A core course that must be satisfactorily completed in order to complete the requirements of the program. It lays the foundations for higher level courses. A foundation course assures that students are academically and personally ready to progress their degree. The foundation courses are further categorized as follows:

i. **Fundamental:** A required course you have to complete in order to enroll in a more advanced course. The prerequisite course usually teaches the basic information necessary to succeed in the more advanced course. It is the most basic or most important course on which other courses depend.

ii. **Intermediate:** Courses that are suitable for learners with some degree of skill or competence in that particular discipline area of study

iii. **Advanced:** Courses that involve higher and more complex levels of knowledge and understanding than introductory or foundational learning. It means the student has attained a level of knowledge and understanding of a particular area or topic that goes beyond basic terminology and definitions and is ready to be involved in Analysis, Synthesis and Evaluation of information related to a specific topic or area of learning.

b. **Elective:** A course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course. Elective courses can fall either under specialization or general category.

i. **General:** Courses that are designed to develop learners' general knowledge, skills and attitudes, often to prepare students for more advanced education programmes. General courses complement the more specialised learning undertaken in a student's chosen field of study and contributes to the flexibility which graduates are increasingly required to demonstrate.

ii. **Specialization:** A set of related courses which are structures for students to achieve specific learning outcomes. Specialization can be in a single discipline or multi-disciplinary. Specialization courses is a specified sequence of courses that equips one with specialized knowledge in one's discipline

c. **Interdisciplinary:** These are courses that are entirely outside of the program of study. One may take the course from other disciplines, as long as one meet the course requirements (prerequisites).

d. **Mini Project:** A mini project is considered as a special course involving application of knowledge gained from studying a particular discipline or a particular area of the program of study in solving / analyzing /exploring a real life situation / difficult problem. A process that fosters learners' engagement in studying authentic problems or issues centered on a particular project, theme, or idea. This process is inquiry-based, outcome-oriented, and associated with conducting the curriculum in real-world contexts.

e. **Internship:** An internship is a full-time or part-time work experience during the program study for which one earns course credit and may be paid or considered as volunteer work. Internships allow students to gain real-world experience, determine if they have an interest in a particular career and create a network of professional contacts.

f. **Dissertation:** An elective course designed to acquire special / advanced knowledge, which a student studies on his own with an advisory support by a faculty member. Dissertation is an ordered and critical exposition of existing knowledge in any field or part of a field of study and is expected to provide a good training for the student in R&D work and technical leadership.

**g. Capstone project**: A final course in a sequence of courses that provides an opportunity for students to integrate the knowledge and skills they have acquired. The learning outcomes of the capstone will normally map into the learning outcomes for the program. It is a substantial, compulsory project that consolidates one's learning and demonstrates that one has acquired the necessary skills and knowledge during the program of study. One usually completes it during the final year of your course.

**Common Core (Credit Courses):**

Students are expected to earn a certain specified number of credits in their coursework towards Common Core, during their academic programme. While some courses are in workshop mode, which can be completed over a few days at a stretch, there are other courses which are offered for a few hours per week throughout a semester. Students take these courses planned for each academic programme, over multiple semesters. Credits range from 1 to 4, which are directly proportional to the number of hours required to complete a course. There are both 'mandatory' and 'choice' courses, with levels within them.

**Common Core (Non – Credit): Graduate Requirement**:

Engagements under this category do not carry credits but are mandatory for the students to complete them during the academic programme, to be considered eligible to graduate / earn the degree.
These could be:
1. **Courses** embedded in the academic programme, where the students must ensure that they attend a minimum of 75% of the classroom hours and meet the assessment criteria, if any.
2. **Community Service activities** under which the students have to log a minimum number of hours in a semester by rendering certain prescribed services to the society and collect evidence from the concerned authority for having done so. A reflective presentation on the learning and experience gained, together with the impact on the society has to be submitted on completion of the required no. of hours as per the respective program.

**Courses under various categories can be further classified as:**

- **100 Level Courses**: These courses offer an introduction to a subject area and are designed for students in the first year of study. These courses have no prerequisites and are generally courses defining basic concepts or presenting the terminology of a discipline.
- **200 Level Courses**: These courses are built on previous units and are normally taken in the second year or later; they may also be available to students with advanced prior knowledge. They are Courses of intermediate college-level difficulty; courses with 100-level course(s) as prerequisite(s).
- **300 Level Courses**: These courses are usually taken in third year or later, after 200-level study in the area. They may also be available to students with advanced prior knowledge. They are courses of advanced college-level difficulty offered for students clearly interested in the discipline or in any stream of the discipline.
- **400 Level Courses**: These units of study are advanced courses and are normally taken in the third year or later as the final elements of a three year or four year degree or an integrated degree. The level indicates that the student will be demonstrating coherence and breadth or depth of knowledge and skills. The student may need to have completed a prerequisite course to study a 400 level course.

**Prerequisite:** A prerequisite to ‘’Course X’’ is a course that must be successfully completed before the student can undertake ‘’Course X’.