UNDERGRADUATE DEGREE
COURSES IN

COMPUTER SCIENCE
&
ENGINEERING

(Engineering &Technology)

With
Minor Degree Courses in AI and ML

[Syllabus – 2022-23 onwards]

Department of Computer Science & Engineering
Dibrugarh University Institute of Engineering and Technology, Dibrugarh University
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India

All India Council for Technical Education
Model curriculum for
Undergraduate Degree Courses in Engineering & Technology

COMPUTER SCIENCE AND ENGINEERING

CONTENTS

All India Council for Technical Education
Model curriculum for Undergraduate Degree Courses in Engineering & Technology

COMPUTER SCIENCE AND ENGINEERING

Chapter -1
General, Course structure & Theme
&
Semester-wise credit distribution

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5credit
2 Hours Practical(Lab)/week	1 credit

B. Range of credits-A student will be eligible to get Graduate degree in Engineering, if he/she completes 168 credits. A student will be eligible to get Under Graduate degree with Honours, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

C. Structure of Undergraduate Engineering program:

Sl. No.	Category	Credit Breakup for CSE students
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	22
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	24
4	Professional core courses	56
5	Professional Elective courses relevant to chosen specialization/branch	15
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	21
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution]	(non-credit)
	Total	**162**

**Minor variation is allowed as per need of the respective disciplines.*

D. Structure of Undergraduate Engineering program with minor degree course:

Sl. No.	Category	Credit Breakup for CSE students
1	Minor Degree Course (AI and ML)	**18**

Note: *This course is optional for students pursuing B. Tech degree. This course will be in addition to the general B. Tech Course in Computer Science & Engineering.*

E. Credit distribution in the First year of Undergraduate Engineering program:

	Lecture	**Tutorial**	**Laboratory/Practical**	**Total credits**
Chemistry-I	3	1	3	5.5
Physics	3	1	3	5.5
Maths-1	3	1	0	4
Maths-2	3	1	0	4
Programming for Problem solving	3	0	4	5
English	2	0	2	3
Engineering Graphics & Design	1	0	4	3
Workshop/ Practical	1	0	4	3
Basic Electrical Engg.	3	1	2	5
*Maths-3	3	1	0	4

These courses may be offered preferably in the later semesters

F. Course code and definition:

Course code	**Definitions**
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
CSE	Professional core courses
CSE-ELV	Professional Elective courses
CSE-O-ELV	Open Elective courses
MC	Mandatory courses
AIML	Minor Degree Course in AI and ML

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	HSMC 101	English	2	0	2	3	1
2	HSMC 201	Managerial Economics	3	0	0	3	4
3	HSMC 302	Management and Accountancy	3	1	0	4	5
4	HSMC 222	Technical English for Engineers	0	0	4	2	4
Total Credits:						**12**	

BASIC SCIENCE COURSE [BSC]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	BSC101	Physics (Semi-conductor Physics)	3	1	3	5.5	2
2	BSC 104	Mathematics-II (Probability and Statistics)	3	1	0	4	2
3	BSC 103	Mathematics-I (Calculus and LinearAlgebra)	3	1	0	4	1
4	BSC 102	Chemistry-I	3	1	3	5.5	2
5	BSC 301	Mathematics-III (Differential Calculus)	3	0	0	3	3
Total Credits:						**22**	

ENGINEERING SCIENCE COURSE [ESC]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	ESC 101	Basic Electrical Engineering	3	1	2	5	1
2	ESC 102	Engineering Graphics & Design	1	0	4	3	1
3	ESC 201	Programming for Problem Solving	3	0	4	5	2
4	ESC 202	Workshop/Manufacturing Practices	1	0	4	3	2
5	ESC 302	Digital Electronics	3	0	4	5	4
6	ESC 501	Signals and Systems	3	0	0	3	5
Total Credits:						**24**	

PROFESSIONAL CORE COURSES [PCC]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	CSE-301	Principles of Programming Language	3	0	0	3	3
2	CSE-302	Data Structure & Algorithms	3	0	4	5	3
3	CSE-313	Software tools	0	0	4	2	3
4	CSE-304	Computer Organization and Architecture	3	0	4	5	3
5	CSE-401	Discrete Mathematics	3	1	0	4	4
6	CSE-402	Operating Systems	3	0	4	5	4
7	CSE-403	Object OrientedProgramming	2	0	4	4	4
8	CSE-404	Database Management Systems	3	0	4	5	4
9	CSE-501	Design and Analysis of Algorithms	3	0	4	5	5
10	CSE-502	Computer Network-I	3	0	4	5	5
11	CSE-503	Formal Language, Automats and Compiler	3	0	0	3	5
12	CSE- 601	Compiler Design	3	0	4	5	6
13	CSE – 602	Computer Networks-II	3	0	4	5	6
Total Credits:						**56**	

PROFESSIONAL ELECTIVE [PEC]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	CSE-ELV-501	Elective - I	3	0	0	3	5
2	CSE-ELV-601	Elective - II	3	0	0	3	6
3	CSE-ELV-602	Elective - III	3	0	0	3	7
4	CSE-ELV-701	Elective - IV	3	0	0	3	7
5	CSE-ELV-702	Elective - V	3	0	0	3	8
Total Credits						**15**	

OPEN ELECTIVE COURSES [OEC]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	CSE-O-ELV-601	Open Elective – I	3	0	0	3	6
2	CSE-O-ELV-701	Open-Elective-II	3	0	0	3	7
3	CSE-O-ELV-801	Open-Elective-III	3	0	0	3	8
4	CSE-O-ELV-802	Open-Elective-IV	3	0	0	3	8
Total Credits:						**12**	

MINOR DEGREE COURSE IN AI AND ML [AIML]

Sl. No	Code No.	Course Title	Hours per week			Total Credits	Semester
			Lecture	Tutorial	Practical		
1	AIML-01	Introduction to AI & Machine Learning	3	0	2	4	3
2	AIML-02	Introduction to Data Analytics	3	0	2	4	4
3	AIML-03	Deep Learning and Neural Network	3	0	2	4	5
4	AIML-04	Special topics in Artificial Intelligence	3	0	0	3	6
5	AIML-05	Applications of AI	3	0	0	3	7
Total Credits:						**18**	

4 year Curriculum structure
Undergraduate Degree in Engineering & Technology

Branch / course: Computer Science and Engineering
Total credits (4 year course): 168

I. Induction Program (Please refer Appendix-A for guidelines)

Induction program (mandatory)	**3 weeks duration** (Please refer Appendix-A for guidelines & also details available in the curriculum of Mandatory courses)
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch &Innovations

II. Semester-wise structure of curriculum

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Semester I (First year] Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Course Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Basic Science course	BSC 103	Mathematics-I	3	1	0	4
2	Engineering Science Course	ESC 102	Engg. Graphics & Design	0	0	4	2
3	Engineering Science Course	ESC 101	Basic Electrical Engineering	3	1	0	4
4	Engineering Science Course	ESC 111	Basic Electrical Engineering Laboratory	0	0	2	1
5	Engineering Science Course	ESC104	Workshop	1	0	4	3
6	Humanities & Social Sciences including Management courses	HSMC 101	English	2	0	0	2
7	Humanities & Social Sciences including Management courses	HSMC111	English	0	0	2	1
			Total credits				**17**

Semester II (First year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Basic Science course	BSC 102	Chemistry-I	3	1	0	4
2	Basic Science course	BSC 112	Chemistry-I Laboratory	0	0	3	1.5
3	Basic Science course	BSC101	Physics-I	3	1	0	4
4	Basic Science course	BSC111	Physics-I Laboratory	0	0	3	1.5
5	Basic Science course	BSC 104	Mathematics-II (Probability and Statistics)	3	1	0	4
6	Engineering Science Course	ESC 103	Programming for Problem Solving	3	0	0	3
7	Engineering Science Course	ESC 113	Programming for Problem Solving Laboratory	0	0	4	2
8	Engineering Science Course	ESC 112	Computer Aided Drawing	0	0	2	1
			Total credits				**21**

Semester III (Second year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Professional Core Courses	CSE 301	Principles of Programming Language	3	0	0	3
2	Professional Core Courses	CSE-302	Data structure & Algorithms	3	0	0	3
3	Professional Core Courses	CSE-312	Data structure & Algorithms Laboratory	0	0	4	2
4	Engg. Science Course	ESC 301	Digital Electronics	3	0	0	3
5	Engg. Science Course	ESC 311	Digital Electronics Laboratory	0	0	4	2

6	Professional Core Courses	CSE-313	Software tools	0	0	4	2
7	Basic Science course	BSC 301	Mathematics-III (Differential Calculus)	3	0	0	3
8	Professional Core Courses	CSE- 304	Computer Organization & Architecture	3	0	0	3
9	Professional Core Courses	CSE- 314	Computer Organization & Architecture Laboratory	0	0	4	2
10	Project/seminar/ Internship, etc.	CSE - 315	Internship - I	0	0	3	3
11	Mandatory Course	MC 201	Indian Knowledge System	-	-	-	0
12	Minor Degree Course	AIML-01	Introduction to AI & Machine Learning	3	0	2	4
			Total credits				**30**

Semester IV (Second year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Professional Core Courses	CSE -401	Discrete Mathematics	3	1	0	4
2	Professional Core Courses	CSE -402	Operating Systems	3	0	0	3
3	Professional Core Courses	CSE -412	Operating Systems Laboratory	0	0	4	2
4	Professional Core Courses	CSE -403	Object Oriented Programming	2	0	0	2
5	Professional Core Courses	CSE -413	Object Oriented Programming Laboratory	0	0	4	2
6	Professional Core Courses	CSE -404	Database Management Systems	3	0	0	3
7	Professional Core Courses	CSE -414	Database Management Systems Laboratory	0	0	4	2
8	Humanities &Social Sciences including Management courses	HSMC 201	Managerial Economics	3	0	0	3
9	Humanities &Social Sciences including Management courses	HSMC 222	Technical English for Engineers	0	0	4	2
10	Minor Degree Course	AIML-02	Introduction to Data Analytics	3	0	2	4
			Total credits				**27**

Semester V (Third year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Engineering Science Course	ESC501	Signals &Systems	3	0	0	3
2	Professional CoreCourses	CSE -501	Design & Analysis ofAlgorithms	3	0	0	3
3	Professional CoreCourses	CSE -511	Design &Analysis of Algorithms Laboratory	0	0	4	2
4	Professional CoreCourses	CSE -502	Computer Network-I	3	0	0	3
5	Professional CoreCourses	CSE -512	Computer Network-I Laboratory	0	0	4	2
6	Professional CoreCourses	CSE -503	Formal Language & AutomataTheory	3	0	0	3
7	Humanities & Social Sciences including Management courses	HSMC-302	Management & Accountancy	3	1	0	4
8	Professional Elective courses	CSE-ELV-501	Elective-I	3	0	0	3
9	Mandatory Courses	MC301	Constitution of India	-	-	-	0
10	Project/seminar/Internship, etc.	CSE 513	Internship - II	0	0	4	4
11	Minor Degree Course	AIML-03	Deep Learning & Neural Network	3	0	2	4
Total credits							**31**

Semester VI (Third year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Professional Core Courses	CSE -601	Compiler Design	3	0	0	3
2	Professional Core Courses	CSE -611	Compiler Design Laboratory	0	0	4	2
3	Professional Core Courses	CSE -602	Computer Network-II	3	0	0	3
4	Professional Core Courses	CSE -612	Computer Network-II Laboratory	0	0	4	2
5	Professional Elective courses	CSE-ELV-601	Elective-II	3	0	0	3
6	Open Elective courses	CSE-O-ELV-601	Open Elective-I	3	0	0	3
7	Minor Degree Course	AIML-04	Special Topics in Artificial Intelligence	3	0	0	3
			Total credits				**19**

Semester VII (Fourth year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Professional Elective courses	CSE-ELV-701	Elective-III	3	0	0	3
2	Professional Elective courses	CSE-ELV-702	Elective-IV	3	0	0	3
3	Open Elective courses	CSE-O-ELV-701	Open Elective-II	3	0	0	3
4	Project/seminar/ Internship, etc.	CSE-711	Internship-III	0	0	4	4
5	Project	CSE-712	Project-I	0	0	8	4
6	Minor Degree Course	AIML-05	Applications of AI	3	0	0	3
			Total credits				**20**

Semester VIII (Fourth year) Curriculum
Branch/Course: Computer Science Engineering

Sl. No.	Type of course	Code	Course Title	Hours per week			Credits
				Lecture	Tutorial	Practical	
1	Professional Elective courses	CSE-ELV-801	Elective-V	3	0	0	3
2	Open Elective courses	CSE-ELV-O-802	Open Elective-III	3	0	0	3
3	Open Elective courses	CSE-O-ELV-801	Open Elective-IV	3	0	0	3
4	Project	CSE-811	Project-II	0	0	8	4
5	Project/seminar/ Internship, etc.	CSE-812	Grand-VIVA	0	0	2	2
			Total credits				**15**

List of Electives:

5th Semester:

CSE-ELV-501	**Elective-I**	**3L:0T:0P**	**3 Credits**

- Computer Graphics.
- Machine learning
- Cloud Computing

6th Semester:

CSE-ELV-601	**Elective-II**	**3L:0T: 0P**	**3 Credits**

- Image Processing
- Embedded System
- Natural language Processing.
- Data analytics
- Soft Computing

CSE-O-ELV-601	**Open Elective-I**	**3L:0T: 0P**	**3 Credits**

- Graph Theory
- Information Theory and Coding
- Wireless Network
- Medical Robotics

7th Semester:

CSE-ELV-701& 702	**Elective- III & IV**	**3L:0T: 0P**	**3 Credits**

- Practical Reinforcement learning
- Internet of Things
- Neural Network and deep learning
- Peer to peer network
- Data Mining
- Real time cyber thread detection and mitigation.
- Advanced Computer Architecture
- Ad-Hoc And Sensor Network
- Computational Geometry
- Advanced Design and analysis of Algorithm

CSE-O-ELV-701	**Open Elective-II**	**3L:0T: 0P**	**3 Credits**

- Programming in JAVA
- Biology for Engineers

8th Semester:

CSE-ELV-801	Elective-V	3L:0T: 0P	3 Credits

- Artificial Intelligence
- Parallel and Distributed Algorithm
- Computational Complexity
- Real Time system.
- Web Technology
- Theory of Computation
- Distributed System

CSE-O-ELV-801	Open Elective-III	3L:0T: 0P	3 Credits

- Cryptography and Network Security
- Mobile computing
- Application of Fuzzy logic
- Practical Applications of Block Chains
- Quantum Physics

CSE-O-ELV-802	Open Elective-IV	3L:0T: 0P	3 Credits

- Software Engineering
- Cyber law and Ethics
- Big Data Management & Data Lakes
- Generative AI