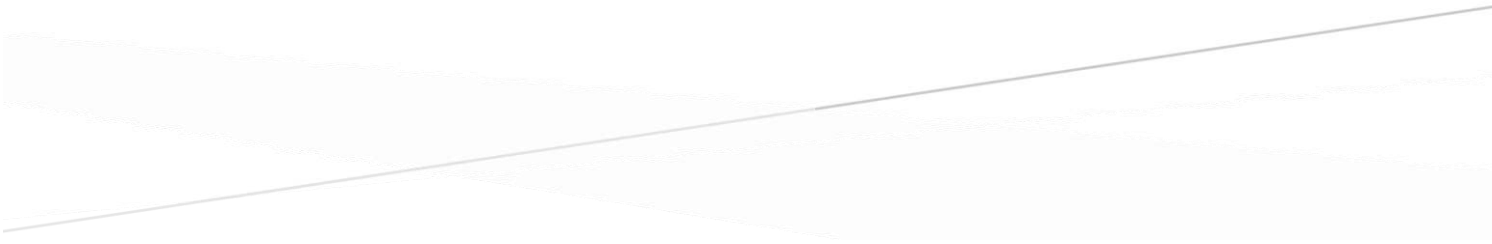
HERITAGE INSTITUTE OF TECHNOLOGY

(An Autonomous Institute Under MAKAUT)

COURSE STRUCTURE and DETAIL SYLLABUS

B. Tech in Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
(For 2022 admitted batch)
July, 2023



FIRST YEAR
FIRST SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	PHYS1001	Physics-I	3	1	0	4	4
2	MATH1101	Mathematics-I	3	1	0	4	4
3	CSEN1001	Programming for Problem Solving	3	0	0	3	3
Total Theory			**9**	**2**	**0**	**11**	**11**
B. Practical							
1	PHYS1051	Physics I Lab	0	0	3	3	1.5
2	CSEN1051	Programming for Problem Solving Lab	0	0	4	4	2
3	MECH1051	Workshop / Manufacturing Practice	1	0	4	5	3
Total Practical			**1**	**0**	**11**	**12**	**6.5**
Total of Semester without Honors			**10**	**2**	**11**	**23**	**17.5**
C. Honors							
1	ECEN1011	Basic Electronics	3	0	0	3	3
2.	ECEN1061	Basic Electronics Lab	0	0	2	2	1
Total Honors			**3**	**0**	**2**	**5**	**4**
Total of Semester with Honors			**13**	**2**	**13**	**28**	**21.5**

FIRST YEAR
SECOND SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CHEM1001	Chemistry I	3	1	0	4	4
2	MATH1201	Mathematics II	3	1	0	4	4
3	ELEC1001	Basic Electrical Engineering	3	1	0	4	4
4	HMTS1202	Business English	2	0	0	2	2
Total Theory			**11**	**3**	**0**	**14**	**14**
B. Practical							
1	CHEM1051	Chemistry I Lab	0	0	3	3	1.5
2	ELEC1051	Basic Electrical Engineering Lab	0	0	2	2	1
3	MECH1052	Engineering Graphics & Design	1	0	4	5	3
4	HMTS1252	Language Lab	0	0	2	2	1
Total Practical			**1**	**0**	**11**	**12**	**6.5**
Total of Semester without Honors			**12**	**3**	**11**	**26**	**20.5**
C. Honors							
1	HMTS1011	Communication for Professionals	3	0	0	3	3
2	HMTS1061	Communication for Professionals Lab	0	0	2	2	1
Total Honors			**3**	**0**	**2**	**5**	**4**
Total of Semester with Honors			**15**	**3**	**13**	**31**	**24.5**

SECOND YEAR
THIRD SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSEN2101	Data Structures and Algorithms	4	0	0	4	4
2	CSEN2102	Discrete Mathematics	4	0	0	4	4
3	CSEN2103	Python Programming	3	0	0	3	3
4	ECEN2104	Digital Logic	3	0	0	3	3
5	HMTS2001	Human Values and Professional Ethics	3	0	0	3	3
Total Theory			**17**	**0**	**0**	**17**	**17**
B. Practical							
1	CSEN2151	Data Structures and Algorithms Lab	0	0	3	3	1.5
2	CSEN2153	Python Programming Lab	0	0	3	3	1.5
3	ECEN2154	Digital Logic Lab	0	0	2	2	1
Total Practical			**0**	**0**	**8**	**8**	**4**
Total of Semester			**17**	**0**	**8**	**25**	**21**

SECOND YEAR
FOURTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSEN2201	Design & Analysis of Algorithms	4	0	0	4	4
2	CSEN2202	Computer Organization and Architecture	4	0	0	4	4
3	CSEN2203	Operating Systems	3	0	0	3	3
4	MATH2203	Operations Research	4	0	0	4	4
5	AEIE2206	Introduction to Smart Sensing Technology for AI	3	0	0	3	3
	EVSC2016	Environmental Sciences (Mandatory)	2	0	0	2	0
Total Theory			**20**	**0**	**0**	**20**	**18**
B. Practical							
1	CSEN2251	Design & Analysis of Algorithms Lab	0	0	3	3	1.5
2	CSEN2252	Computer Architecture Lab	0	0	2	2	1
3	CSEN2253	Operating Systems Lab	0	0	3	3	1.5
Total Practical			**0**	**0**	**8**	**8**	**4**
Total of Semester			**20**	**0**	**8**	**28**	**22**

THIRD YEAR
FIFTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSEN3101	Database Management Systems	4	0	0	4	4
2	CSEN3003	Object Oriented Programming	4	0	0	4	4
3	CSEN3104	Introduction to Artificial Intelligence	3	0	0	3	3
4	CSEN3105	Data Mining	3	0	0	3	3
5	CSEN3131- CSEN3140	Professional Elective-I	3	0	0	3	3
	CSEN3133 CSEN3136 CSEN3137 CSEN3139 MATH3131 MATH3132	Web Technologies Introduction to Soft Computing Introduction to Information Retrieval Randomized Algorithms Linear Algebra for Data Analysis Probability and Statistical Methods					
Total Theory			**17**	**0**	**0**	**17**	**17**
B. Practical							
1	CSEN3151	Database Management Systems Lab	0	0	3	3	1.5
2	CSEN3053	Object Oriented Programming Lab	0	0	3	3	1.5
3	CSEN3154	Introduction to AI Lab	0	0	3	3	1.5
4	CSEN3155	Data Mining Lab	0	0	2	2	1
Total Practical			**0**	**0**	**11**	**11**	**5.5**
Total of Semester without Honors			**17**	**0**	**11**	**28**	**22.5**

THIRD YEAR
SIXTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSEN3002	Formal Language & Automata Theory	4	0	0	4	4
2	CSEN3203	Fundamentals of Machine Learning	3	0	0	3	3
3	HMTS3201	Economics for Engineers	3	0	0	3	3
4	CSEN3231 - CSEN3240	Professional Elective-II	3	0	0	3	3
	CSEN3235 CSEN3236 CSEN3238 CSEN3239	Cloud Computing Big Data and IoT Stochastic Theory Introduction to Cryptography					
5		Open Elective-I	3	0	0	3	3
	AEIE3221 ECEN3222 ECEN3223 MATH3221 MATH3223	Fundamentals of Sensors and Transducers Designing with Processors and Controllers Analog and Digital Communication Computational Mathematics Scientific Computing					
6	INCO3016	Indian Constitution and Civil Society (Mandatory)	2	0	0	2	0
Total Theory			**18**	**0**	**0**	**18**	**16**
B. Practical							
1	CSEN3253	Fundamentals of Machine Learning Lab	0	0	3	3	1.5
Total Practical			**53**	**0**	**33**	**86**	**1.5**
C. Sessional							
1	CSEN3293	Term Paper and Seminar	0	0	4	4	2
Total Sessional			**0**	**0**	**4**	**4**	**2**
Total of Semester			**71**	**0**	**37**	**108**	**19.5**

FOURTH YEAR
SEVENTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	HMTS4101	Principles of Management	3	0	0	3	3
2	CSEN4141-CSEN4150	Professional Elective-III	3	0	0	3	3
	CSEN4141 CSEN4142 CSEN4143 CSEN4144	Introduction to Image Processing Deep Learning Fundamentals of Computer Networks Introduction to Software Engineering					
3		Open Elective-II	3	0	0	3	3
	AEIE4121 AEIE4122 CHEN4121 ECEN4121 ECEN4123 MATH4121	Instrumentation and Telemetry Linear Control Systems and Applications Industrial Total Quality Management Software Defined Radio Error Control Coding for secure Data Transmission Methods in Optimization					
4		Open Elective-III	3	0	0	3	3
	AEIE4127 BIOT4124 ECEN4127 ECEN4128 MATH4126	Introduction to Embedded System Biosensor Ad Hoc Wireless Networks Introduction to VLSI Design Linear Algebra					
Total Theory			**12**	**0**	**0**	**12**	**12**
B. Sessional							
1	**CSEN4191**	**Industrial Training / Internship**	**-**	**-**	**-**	**-**	**2**
2	**CSEN4195**	Project-I	0	0	8	8	4
Total Sessional			**0**	**0**	**8**	**8**	**6**
C. Practical							
1		Professional Elective -III Lab	0	0	2	2	1
2	CSEN4171 CSEN4172 CSEN4173 CSEN4174	Introduction to Image Processing Lab Deep Learning Lab Fundamentals of Computer Networks Lab Introduction to Software Engineering Lab					
Total Practical			**0**	**0**	**2**	**2**	**1**
Total of Semester			**12**	**0**	**10**	**22**	**19**

FOURTH YEAR
EIGHTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
A. Theory							
1	CSEN4231-CSEN4240	Professional Elective-IV	3	0	0	3	3
	CSEN4037	Compiler Design					
	CSEN4038	Mobile Computing					
	CSEN4231	Natural Language Processing					
	CSEN4233	Pattern Recognition					
	CSEN4235	Social Network Analysis					
	CSEN4236	Computer Vision					
2	CSEN4241-CSEN4250	Professional Elective-V	3	0	0	3	3
	CSEN4241	Robotics					
	CSEN4242	Business Analytics					
	CSEN4243	Web Mining					
3		Open Elective-IV	3	0	0	3	3
	AEIE4221	Process Instrumentation					
	AEIE4222	Medical Instrumentation					
	BIOT4221	Computational Biology					
	BIOT4222	Non-conventional Energy					
	BIOT4223	Biology for Engineers					
	CHEN4222	Introduction to Solar and Wind Technology					
	ECEN4223	Optical Fiber Communication					
Total Theory			**9**	**0**	**0**	**9**	**9**
B. Sessional							
1	CSEN4295	Project-II	0	0	16	16	8
2	CSEN4297	Comprehensive Viva-voce	-	-	-	-	1
Total Sessional			**0**	**0**	**16**	**16**	**9**
Total of Semester			**9**	**0**	**16**	**25**	**18**

Open Electives to be offered by Computer Science and Engineering department for Non-departmental students

Sl.	Semester	Paper Code	Course Title	Contact Hours / Week				Credit Points
				L	T	P	Total	
1	6th	CSEN3221	Fundamentals of RDBMS	3	0	0	3	3
2	7th	CSEN4121	Fundamentals of Operating Systems	3	0	0	3	3
3	7th	CSEN4126	Intelligent Web and Big Data	3	0	0	3	3
4	8th	CSEN4221	Basics of Mobile Computing	3	0	0	3	3

Credit Summary for B Tech Programme with effect from 2018-2019

Sl.	Course Type	Credit Points
1	Humanities and Social Sciences including Management Courses	12
2	Basic Science Courses	23
3	Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer, etc.	23
4	Professional Core Courses	58
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	17
8	Mandatory Courses (Non-credit) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	0
Total		**160**
9	Honors Courses	8
Grand Total		**168**

Honors Course for B. Tech Computer Science & Engineering AI & ML Students

Sl.	Semester	Paper Code	Course Title	Contact Hours / Week			Credit Points
				L	T	P	
1	1st	ECEN1011	Basic Electronics	3	0	0	3
2		ECEN1061	Basic Electronics Lab	0	0	2	1
3	2nd	HMTS1011	Communication for Professionals	3	0	0	3
4		HMTS1061	Professional Communication Lab	0	0	2	1
Total							**8**

Definition of Credit (as per AICTE):

- 1 Hour Lecture (L) per Week = 1 Credit
- 1 Hour Tutorial (T) per Week = 1 Credit
- 1 Hour Practical (P) per Week = 0.5 Credits
- 2 Hours Practical (Lab) per Week = 1 Credit

Range of Credits (as per AICTE):

- A total of 160 credits will be necessary for a student to be eligible to get B Tech degree.
- A student will be eligible to get B Tech degree with Honors if he/she completes an additional 20 credits. These could be acquired through various Honors Courses offered by the respective departments.
- A part or all of the above additional credits may also be acquired through MOOCs. Any student completing any course through MOOC will have to submit an appropriate certificate to earn the corresponding credit.
- For any additional information, the student may contact the concerned HODs.

Swayam/MOOCs Courses recommended to the students of CSE department

Sl.	Code	Name	Credit Points	Corresponding Online Course	Offered by	Platform
1	ECEN1011	Basic Electronics	3	Fundamentals of Semiconductor Devices	IISc Bangalore	NPTEL
2	ECEN1061	Basic Electronics Lab	1			
3	HMTS1011	Communication for Professionals	3	Effective Business Communication **AND** Developing Soft Skills and Personality	IIM Bangalore	Swayam
4	HMTS1061	Professional Communication Lab	1		IIT Kanpur	Swayam