VIT Vidyalankar Institute of Technology
Accredited A+ by NAAC

Vidyalankar Institute of Technology

An Autonomous Institute affiliated to University of Mumbai

Master of Technology

in

Computer Engineering

Programme Structure

(With effect from the Academic Year 2022-23)

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated, and taken forward in a systematic manner. Therefore, autonomy for Vidyalankar Institute of Technology is not merely a transition from pre-cooked syllabi to self-designed curriculum. Autonomy curriculum of the Institute offers required academic flexibility with emphasis on industry requirements and market trends, employability, problem-solving approach and research ability which leads to improving competency level of learners with diverse strengths. In line with this, the curriculum framework designed is **Choice-Based Credit and Grading System (CBCGS)**. Number of credits for courses learnt by learners, internships and dissertation is finalized considering the scope of study and the ability that a learner should gain through the programme.

The curriculum has core courses of engineering, specific to the branch. These courses are completed in first year of the engineering programme that enables learners to work on their chosen dissertation topic during their final year. The curriculum planned by the Institute offer flexibility and diversity to learners to choose any set of courses from a basket of professional electives. Learner can also choose to specialize in a domain as per their field of interest. The selection of unique specialization tracks based on recent developments and industrial requirements is a salient feature of this curricula ensuring employability. Each specialization track has mandatory courses positioned and sequenced to achieve sequential and integral learning for the required depth of the specific domain. Learner can choose to complete these courses in first year of the engineering program that enables him/her to prepare for research during their final year. Credits additional to core and professional elective courses, include dissertation, internships, advanced courses in the field of computer engineering, multi-disciplinary courses, special skill development courses and similar knowledge that make learner capable to do further research or work in industrial environment.

Thus, the academic plan of VIT envisages a shift from summative to formative and competency-based learning system which will enhance learner's ability towards higher education, employability and entrepreneurship.

Chairman, Board of Studies
Department of Computer Engineering
Vidyalankar Institute of Technology

Chairman, Academic Council
Vidyalankar Institute of Technology

CREDIT STRUCTURE

Learner is expected to complete requirement of 70 credits (with minimum credits under each category as mentioned below) for M.Tech. degree in Computer Engineering.

Sr. No.	Course Category	Credits / Audit
I	Core	16
II	Professional Elective	16
III	Open Elective	08
IV	Internship	04
V	Dissertation	26
Total		**70**

Definition of Credit

Duration	Credit
1 Hr. Lecture (L) per week	1
1 Hr. Tutorial (T) per week	1
1 Hr. Practical (P) per week	0.5

Guidelines for Specialization Certificate

Learner can avail a Specialization Certificate from the Institute stating "Successful completion of Masters of Technology in Computer Engineering with Specialization in <Track Name> " .

Mandatory Courses to be successfully completed to avail Specialization Certificate are as stated in Appendix A.

Opting for track is not mandatory.

Courses Under Various Categories

I. Core Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE63	Advanced Data Structure and Algorithms	3	2	-	4	1
2	CE64	HPC, Cluster and Grid Computing	3	2	-	4	1
3	CE65	Parallel Algorithms and Programming	3	2	-	4	2
4	CE66	Computational Intelligence	3	2	-	4	2

II. Professional Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE67	Building Blocks of Artificial Intelligence	3	2	-	4	1
2	CE68	Machine Learning and Pattern Recognition	3	2	-	4	1
3	CE69	Deep and Reinforcement Learning	3	2	-	4	2
4	CE70	Bio-inspired Artificial Intelligence	3	2	-	4	2
5	CE71	Probability and Statistics for Data Science	3	2	-	4	1
6	CE72	Data Preparation and Exploration	3	2	-	4	1
7	CE73	Big Data	3	2	-	4	2
8	CE74	Natural Language Processing	3	2	-	4	2
9	CE75	Smart Sensors and Internet of Things	3	2	-	4	1
10	CE76	IoT - Application and Communication Protocol	3	2	-	4	1
11	CE77	Wireless Access Technologies	3	2	-	4	2
12	CE78	IOT and Smart Cities	3	2	-	4	2
13	CE79	Data Encryption and Compression	3	2	-	4	1
14	CE80	Ethical Hacking and	3	2	-	4	1

		Digital Forensics					
15	CE81	Database Security and Access control	3	2	-	4	2
16	CE82	Intrusion Detection and Prevention	3	2	-	4	2

III. Open Elective Courses

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	OE04	Sustainability Management	4	-	-	4	-
2	OE05	Operation Research	4	-	-	4	-
3	OE06	IPR and Patenting	4	-	-	4	-
4	OE07	Research Methodology	4	-	-	4	-
5	OE15	Teaching Pedagogy & Educational Technology	4	-	-	4	1
6	OE13*	Online Course 1 (MOOC)	As per course			2	-
7	OE14*	Online Course 2 (MOOC)	As per course			2	-

*Online Courses (MOOC) of 2 credits is equivalent to 30 hours course.

IV. Internship

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE83	Internship	-	8$	-	4	3
2	CE84	Skill Based Course 1	-	4#	-	2	3
3	CE85	Skill Based Course 2	-	4#	-	2	3

$: Internship of 4 credits is equivalent to 120 hours of contact.

#: Skill based Course of 2 credits is equivalent to 60 hours course.

V. Dissertation

Sr. No.	Course Code	Course Name	Hours Per Week			Credits	Preferred Semester
			Theory	Practical	Tutorial		
1	CE86	Dissertation-I	-	20	-	10	3
2	CE87	Dissertation-II	-	32	-	16	4

Course Structure and Assessment Guidelines

for

Master of Technology

in

Computer Engineering

First Year M. Tech. Computer Engineering **Semester: I**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)				Total marks (Passing@45% of total marks)
Code	Name			ISA	MSE	ESE	Lab Work	
CE63	Advanced Data Structure & Algorithms	Theory+ Practical	4	40	20	40	25	125
CE64	HPC, Cluster and Grid Computing	Theory+ Practical	4	40	20	40	25	125
CEXX	Professional Elective-1	Theory+ Practical	4	40	20	40	25	125
CEXX	Professional Elective-2	Theory+ Practical	4	40	20	40	25	125
OEXX*	Open Elective-1	As per course						

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= End Semester Examination

* Selection will be based on the subset of OE courses made available by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Refer Appendix-A for guidelines on Professional Elective Courses and Specialization Certificate

Professional Elective-1 Courses (CEXX)

Course Code	Course Name	Specialization Track Name#
CE71	Probability and Statistics for Data Science	Data Science (DS)
CE75	Smart Sensors and Internet of Things	Internet of Things (IoT)
CE79	Data Encryption and Compression	Computer Security (CSec)

#For details of Specialization Certificate, refer Appendix-A

Professional Elective-2 Courses (CEXX)

Course Code	Course Name	Specialization Track Name#
CE72	Data Preparation and Exploration	Data Science (DS)
CE76	IoT - Application and Communication Protocol	Internet of Things (IoT)
CE80	Ethical Hacking and Digital Forensics	Computer Security (CSec)

#For details of Specialization Certificate, refer Appendix-A

First Year M. Tech. Computer Engineering **Semester: II**

Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)				Total marks (Passing@45% of total marks)
Code	Name			ISA	MSE	ESE	Lab Work	
CE65	Parallel Algorithms and Programming	Theory+ Practical	4	40	20	40	25	125
CE66	Computational Intelligence	Theory+ Practical	4	40	20	40	25	125
CEXX	Professional Elective-3	Theory+ Practical	4	40	20	40	25	125
CEXX	Professional Elective-4	Theory+ Practical	4	40	20	40	25	125
OEXX	Open Elective-2	As per course						

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= End Semester Examination

*Selection will be based on the subset of OE courses made available by the Institute for the semester.

The assessment guidelines for the courses of different credits are mentioned above. Notwithstanding the above, each course faculty shall have the choice to propose her/his assessment methodology based on the nature of the course. However, the proposed assessment methodology shall be approved by a panel constituted at Institute level and published to the learners before the commencement of the semester.

Professional Elective-3 Courses (CEXX)

Course Code	Course Name	Specialization Track Name#
CE73	Big Data	Data Science (DS)
CE77	Wireless Access Technologies	Internet of Things (IoT)
CE81	Database Security and Access control	Computer Security (CSec)

#For details of Specialization Certificate, refer Appendix-A

Professional Elective-4 Courses (CEXX)

Course Code	Course Name	Specialization Track Name#
CE74	Natural Language Processing	Data Science (DS)
CE78	IOT and Smart Cities	Internet of Things (IoT)
CE82	Intrusion Detection and Prevention	Computer Security (CSec)

#For details of Specialization Certificate, refer Appendix-A

Second Year M. Tech. Computer Engineering **Semester: III**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)				Total marks (Passing@45% of total marks)
Code	Name			ISA	MSE	ESE	Lab Work	
CE86	Dissertation-I	Theory + Practical	10	150	-	150	-	300
CEXX*	Internship/ 2 Skilled Based Courses	Practical	4	As per selection				

ISA=In Semester Assessment, MSE= Mid Semester Examination, ESE= End Semester Examination

* Student may choose to complete these 4 credits by selecting CE83 or selecting both CE84 and CE85 as mentioned below.

Course		Head of Learning	Credits	Assessment Guidelines (Marks)				Total marks (Passing@45% of total marks)
Code	Name			ISA	MSE	ESE	Lab Work	
CE83$	Internship	Practical	4	50	-	50	-	100
CE84#	Skill Based Course 1	Practical	2	25	-	25	-	050
CE85#	Skill Based Course 2	Practical	2	25	-	25	-	050

$: Internship of 4 credits is equivalent to 120 hours of contact.

#: Skill based Course of 2 credits is equivalent to 60 hours course.

Second Year M. Tech. Computer Engineering **Semester: IV**
Course Structure and Assessment Guidelines

Course		Head of Learning	Credits	Assessment Guidelines (Marks)				Total marks (Passing@45% of total marks)
Code	Name			ISA	MSE	ESE	Lab Work	
CE87	Dissertation-II	Practical	16	200	-	200	-	400

Appendix A

Guidelines for Professional Elective Courses and Specialization Certificate

Professional Elective courses are designed to meet industrial requirements. All learners must opt for 6 professional elective courses (both Theory and Practical component) as a part of requirement for M.Tech. degree.

Specialization Certificate is introduced in order to build competency of learners in the chosen domain. Department of Computer Engineering offers the following specialization tracks:

1. Artificial Intelligence and Machine Learning (AIML)
2. Data Science (DS)
3. Internet of Things (IoT)
4. Computer Security (CSec)

Learners can take courses from any track. **However, if learners complete all Professional Elective Courses from the same chosen track, they will be eligible to receive a Specialization Certificate from the Institute.**

Learners who choose professional elective courses from different specialisation tracks will not be eligible for a Specialization Certificate.

It should be noted that there are no additional credit requirements for these specialisations.

AIML track: Courses to be chosen for specialization in Artificial Intelligence and Machine Learning

Semester	Course Code	Course Name
I	CE67	Building Blocks of Artificial Intelligence
I	CE68	Machine Learning and Pattern Recognition
II	CE69	Deep and Reinforcement Learning
II	CE70	Bio-inspired Artificial Intelligence

DS track: Courses to be chosen for specialization in Data Science

Semester	Course Code	Course Name
I	CE71	Probability and Statistics for Data Science
I	CE72	Data Preparation and Exploration
II	CE73	Big Data
II	CE74	Natural Language Processing

IoT track: Courses to be chosen for specialization in Internet of Things

Semester	Course Code	Course Name
I	CE75	Smart Sensors and Internet of Things
I	CE76	IoT - Application and Communication Protocol
II	CE77	Wireless Access Technologies
II	CE78	IOT and Smart Cities

CSec track: Courses to be chosen for specialization in Computer Security

Semester	Course Code	Course Name
I	CE79	Data Encryption and Compression
I	CE80	Ethical Hacking and Digital Forensics
II	CE81	Database Security and Access control
II	CE82	Intrusion Detection and Prevention