VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangam, Machhe, Belagavi-590018

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS)
(Effective from the academic year 2025-26)

B.E. in Industrial IoT,

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

III SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	TW & SL	# TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	SL						
1	ASC/PCC	1BMAT301	Program Specific Mathematics (Transforms, Differential Equations & Linear Algebra for IoT Systems)	TD /PSB: Mathematics / Specific department	42	28	0	50	120	3	50	50	100	4
2	IPCC	1BXX302	Data Structures & Algorithms	TD/PSB	42	0	28	50	120	3	50	50	100	4
3	PCC	1BXX303	Digital Electronics and Logic Design	TD/PSB	42	0	28	50	120	3	50	50	100	4
4	PCC	1BXX304	Sensors & Transducers	TD/PSB	42	0	0	48	90	3	50	50	100	3
5	PCC	1BXX305	Fundamentals of Industrial IoT	TD/PSB	42	0	0	48	90	3	50	50	100	3
6	PCCL	1BXXL306	Sensors & IoT Devices Lab	TD/PSB	0	0	28	2	30	2	50	50	100	1
7	AEC	1BXXL307x	Ability Enhancement Course Laboratory**	TD/PSB	0	0	28	2	30	2	50	50	100	1
8	SDC	1BCP308	Community Project (Project-Based Learning) / Societal Project	Any Department/ Respective Engineering Dept.	0	0	0	30	30	2	50	50	100	1
9	NCMC	1BNSS309	National Service Scheme (NSS)	Campus: NSS coordinator	0	0	0	28	28	--	100	---	100	PP
		1BPE309	Physical Education (PE) (Sports and Athletics)	Campus: Physical Education Director										
		1BYOG309	Yoga	Campus: Yoga Teacher										
		1BMUK309	Music	Campus: Music Teacher										
				Total							**500**	**400**	**900**	**21**
10	NCMC	1BMATDIP310	Mathematics course for Lateral Entry Students	TD/PSB -Maths Dept	14	0	0	14	28	3	100	---	100	PP
				Total					**686**		**600**	**400**	**1000**	**21**

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Ability Enhancement Course (Laboratory) 1BxxL307x			
1BxxL307A	Python Programming for IoT	**1BxxL307C**	Fundamentals of Linux & Shell Scripting (IoT-Focused)
1BxxL307B	PCB Design & Soldering Skills	**1Bxx307D**	MATLAB / Simulink for IoT
** The course 1BXXL307 – Ability Enhancement Course Laboratory can be offered either as a single compulsory course. Alternatively, the course 1BXXL307 – Ability Enhancement Course Laboratory shall be offered as multiple elective options under the course codes 1BXXL307x (where *x = A, B, C, D*).			

B.E. in Industrial IoT,

Scheme of Teaching and Examinations-2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

IV SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)		Teaching & Learning Scheme					Examination				Credits
						CI		LI	# TW & SL	TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P							
1	ASC/PCC	1BXX401	Program Specific Mathematics (Probability and Statistics)	TD/PSB:		42	0	0	48	90	3	50	50	100	3
2	IPCC	1BXX402	Industrial Automation & PLC Basics	TD/PSB		42	0	28	50	120	3	50	50	100	4
3	PCC	1BXX403	Database Management Systems	TD/PSB		42	0	28	50	120	3	50	50	100	4
4	PCC	1BXX404	Microcontrollers & Embedded Systems	TD/PSB		42	0	0	48	90	3	50	50	100	3
5	PCCL	1BXXL405	Embedded Systems Lab	TD/PSB		0	0	28	02	30	2	50	50	100	1
6	AEC	1BxxL406	Ability Enhancement Course Laboratory**	TD/PSB		0	0	28	02	30	2	50	50	100	1
7	BSC	1Bxx407	**Programme Specific Biology**	TD / PSB		28	0	0	32	60	3	50	50	100	2
8	SDC	1BEP408	Environmental Science Project	TD/PSB		0	0	0	30	30	3	50	50	100	1
9	**PCC/PEC**	**1Bxx409**	Signals & Systems			42	0	0	48	**90**	**3**	**50**	**50**	**100**	**3**
10	NCMC	1BNSK409	National Service Scheme (NSS)	Campus	NSS coordinator	0	0	0	28	28	--	100	---	100	PP
		1BPEK409	Physical Education (PE) (Sports and Athletics)		Physical Education Director										
		1BYOK409	Yoga		Yoga Teacher										
		1BMUS409	Music		Music Teacher										
					Total					598		550	450	1000	22
11	NCMC	1BMATDIP410	Mathematics course for Lateral Entry Students	TD/PSB -Maths Dept		14	0	0	14	28	--	100	--	100	PP
					Total					626		**650**	**450**	**1100**	22

Ability Enhancement Course (Laboratory) 1BxxL406x

1BxxL406A	IoT Device Programming with Arduino & ESP32	1BxxL406C	Dashboard & Data Visualization Lab
1BxxL406B	Signal processing using Matlab	1BxxL406D	Industrial Safety & IoT Standards

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning, ** The course 1BXXL406x – Ability Enhancement Course Laboratory can be offered either as a single compulsory course. Alternatively, the Ability Enhancement Course Laboratory course can be offered with multiple elective options under the course codes 1BXXL406x

	(where $x = A, B, C, D$).

B.E. in Industrial IoT,

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

V SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	# TW & SL	# TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P							
1	HSMC	1BXX501	Industrial Engineering and management	TD/PSB:	42	0	0	48	90	3	50	50	100	3
2	IPCC	1BXX502	Industrial Robotics & Control	TD/PSB	42	0	28	50	120	3	50	50	100	4
3	PCC	1BXX503	Wireless Sensor Networks	TD/PSB	42	0	0	48	90	3	50	50	100	3
4	PCC	1BXX504	SCADA Systems & Industrial Communication	TD/PSB	42	0	0	48	90	3	50	50	100	3
5	PEC	1BXX505x	**Professional Elective Course-I**	TD/PSB	42	0	0	48	90	3	50	50	100	3
6	BSC	1BRM506	Research Methodology and IPR	TD/PSB-	28	0	0	32	60	02	50	50	100	2
7	PCCL	1BxxL507	PLC and SCADA lab	TD/PSB	0	0	28	02	30	02	50	50	100	1
8	SDC	1BXX508	**Hackathon-Based Project**	CIE: By Departments SEE: Evaluation by industry experts	0	0	0	60	60	--	50	50	100	2
								Total	**630**		**400**	**400**	**800**	**21**

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Professional Elective Course-I

1BXX505A	FPGA-Based System Design for IoT	1BXX505C	Battery Management Systems for IoT Devices
1BXX505B	IoT Sensor Hardware Design & Calibration Techniques	1BXX505D	LPWAN Technologies

B.E. in Industrial IoT

Scheme of Teaching and Examinations-2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

VI SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	# TW & SL	# TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P							
1	IPCC	1BXX601	AI & ML for IoT Systems	TD/PSB-	42	28	0	50	120	3	50	50	100	4
2	PCC	1BXX602	Real-Time Operating Systems (RTOS)	TD/PSB-	42	0	0	48	90	3	50	50	100	3
3	PCC	1BXX603	Cloud Computing for IoT	TD/PSB-	42	0	0	48	90	3	50	50	100	3
4	PCC	1Bxx604	Smart Manufacturing (Industry 4.0)	TD/PSB-	42	0	0	48	90	3	50	50	100	3
5	PEC	1BXX605x	Professional Elective Courses-II	TD/PSB-	42	0	0	48	90	3	50	50	100	3
6	PCCL	1BxxL606	Machine Learning for IoT Lab	TD/PSB-	0	0	28	2	30	2	50	50	100	1
7	AEC	1BxxL607x	**Ability Enhancement Course Laboratory**	TD/PSB-	0	0	28	2	30	2	50	50	100	1
8	SDC	1BXX608	Capstone Project - Phase I	TD/PSB-	0	0	0	90	90	3	100	--	100	3
9	NCMC	1Bxx609	**Universal Human Value**	CIE: TD/PSB	1	0	0	0	28	--	100	---	100	PP
				Total					**630**		**550**	**350**	**900**	**21**

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Professional Elective Course-II

1BXX605A	Edge Computing & Edge AI Deployment	1BXX605C	Advanced Process Control & Instrumentation
1BXX605B	Digital Twin Technology & System Simulation	1BXX605D	Industrial IoT Cybersecurity & Standards

Ability Enhancement Course Laboratory**

1BxxL607A	Digital Twin Modelling Lab	1BxxL607C	Cloud Platforms for IoT
1BxxL607B	ROS Basics (Robot Operating System)	1BxxL607D	Cybersecurity Basics for IoT

** The course 1BXXL607x – Ability Enhancement Course Laboratory can be offered either as a single compulsory course. Alternatively, the course 1BXXL307 – Ability Enhancement Course Laboratory shall be offered as multiple elective options under the course codes 1BXXL307x (where *x = A, B, C, D*).

Note to Chairpersons: If only one course is selected, the title of the course may please be entered at serial number 7 of the Scheme of Teaching and Examinations and the above table, along with this row shall be deleted. In case, multiple courses are selected the above table shall be filled with the course titles, and this row shall be deleted.

B.E. in Industrial IoT,

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

VII SEMESTER (Swappable VII and VIII SEMESTER) (SCHEME-A)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week					Examination				Credits
					CI		LI	# TW & SL	# TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P							
1	IPCC	1BXX701	IoT System Integration & Deployment	TD/PSB-	42	28	0	50	120	3	50	50	100	4
2	PEC	1BXX702x	Professional Elective Course-III	TD/PSB-	42	0	0	48	90	3	50	50	100	3
3	PEC	1BXX703x	Professional Elective Course -IV	TD/PSB-	42	0	0	48	90	3	50	50	100	3
4	OEC	1BXX704x	Open Elective Course-I	TD/PSB-	42	0	0	48	90	3	50	50	100	3
5	SDC	1BXX705	Capstone Project - Phase-II	TD/PSB-	0	0	0	210	210	3	100	100	200	7
6	NCMC	1BIKS706	Indian Knowledge System	**TD/PSB**	1	0	0	28	28	---	100	--	100	PP
				Total					**628**	**15**	**400**	**300**	**700**	**20**

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Professional Elective Course-III

1Bxx702A	5G/6G for Industrial IoT & Smart Factories	1Bxx702C	AI Ops for IoT Systems
1Bxx702B	Time-Series Analysis & Forecasting for IIoT	1Bxx702D	Industrial Visualization Dashboards

Professional Elective Course-IV

1BXX703A	Industrial Hydraulics & Pneumatics	1BXX703C	RF System Design for IoT
1BXX703B	Predictive Maintenance Analytics	1BXX703D	Industrial Drives, Motion Control & Mechatronics

Open Elective Course-I

1BXX704A		1BXX704C	
1BXX704B		1BXX704D	**Foreign Language** (NPTEL/SWAYAM/online VTU)

B.E. in Industrial IoT

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

VIII SEMESTER (Swappable VII and VIII SEMESTER) (SCHEME-A)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week					Examination				
					CI		LI	# TW & SL	# TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
					L	T	P							
1	PEC	1Bxx801x	Professional Elective-V (NPTEL/VTU Online Course)	Online Evaluation	0	0	0	90	90	3	50	50	100	3
2	OEC	1Bxx802x	Open Elective-II (NPTEL/VTU Online Course)	Online Evaluation	0	0	0	90	90	3	50	50	100	3
3	SDC	1Bxx803x	Internship (15 weeks or 90 working days)	--	--	--	--	--	360	3	100	100	200	09
			Total						**540**	**9**	**200**	**200**	**400**	**15**

Professional Elective Course (Online courses)-V

1Bxx801A	NPTEL/VTU Online Course	1Bxx801C	NPTEL/VTU Online Course
1Bxx801B	NPTEL/VTU Online Course	1Bxx801D	NPTEL/VTU Online Course

Open Elective Courses -II (Online Courses)

1Bxx802A	NPTEL/VTU Online Course	1Bxx802C	NPTEL/VTU Online Course
1Bxx802B	NPTEL/VTU Online Course	1Bxx802D	**Foreign Language** (NPTEL/SWAYAM/online VTU)

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Types of Internships (Course Code: 1Bxx803x)

Students shall undertake one of the following internship types during the eighth semester, as per academic guidelines:

1. **1Bxx803A – Industry Internship**: Shall involve practical exposure and training within an industrial or corporate setting.
2. **1Bxx803B – Research Internship**: Shall focus on academic or applied research under the guidance of faculty or research institutions.
3. **1Bxx803C – Post-Placement Internship**: Shall be undertaken by students who have secured placement, aligning with their future employment domain.
4. **1Bxx803D – Societal Internship**: Shall engage students in community-based or social impact projects with NGOs, government bodies, or civic organizations.
5. **1Bxx803E – Online Internship**: Shall be conducted through recognized digital platforms offering structured internship modules.
6. **1Bxx803F – Skill Enhancement Internship:** Shall be opted by students unable to secure internships, offering credit equivalence through curated online courses available at http:// www.online.vtu.ac.in

	To ensure uniformity, quality, and transparency in the internship process, **VTU has launched a centralized web portal** that serves as a **single platform** for all internship opportunities. Reputed **industries, Centres of Excellence, Research Laboratories**, and other recognized bodies will be registered on this portal. **Students must choose internships exclusively through this portal**. **No other mode of internship selection will be permitted**

B.E. in Industrial IoT

Scheme of Teaching and Examinations 2025

Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)

VII and VIII semesters for the candidates who opt for a two-semesters internship along with Capstone Project (Scheme B)

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	# TW & SL	#- TH/S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P							
1	IPCC	1BXX701	To be completed in the **Summer Semester after 6th semester**							3	50	50	100	4
2	PEC	1BXX702x	Professional Elective Course-III (NPTEL/VTU Online Course)	Online Evaluation						--	50	50	100	3
3	PEC	1BXX703x	Professional Elective Course-IV (NPTEL/VTU Online Course)	Online Evaluation						--	50	50	100	3
4	OEC	1BXX704x	Open Elective Course (NPTEL/VTU Online course)-I	Online Evaluation						---	50	50	100	3
5	SDC	1BXX705	Capstone Project - Phase-II***	TD: PSB:						3	100	100	200	7
6	NCMC	1BIKS706	Indian Knowledge System (VTU online)		1	0	0	0		--	100	--	100	PP
								Total		**6**	**400**	**300**	**700**	**20**
1	PEC	1Bxx801x	Professional Elective-V (NPTEL/VTU Online Course)	Online Evaluation						---	50	50	100	3
2	OEC	1Bxx802x	Open Elective-II (NPTEL/VTU Online Course)	Online Evaluation						---	50	50	100	3
3	SDC	1Bxx803x	Internship (Two- semester internship for a minimum Period of 180 working days or -30 weeks)							3	50	50	100	09
								Total		**3**	**150**	**150**	**300**	**15**

 # TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

	7th semester and 8th semester Credits Total	**38**

NPTEL/VTU Online Professional Elective Course - III

1Bxx703A	**NPTEL/VTU Online Courses**	1Bxx703C		**NPTEL/VTU Online Courses**
1Bxx703B	**NPTEL/VTU Online Courses**	1Bxx704D		**NPTEL/VTU Online Courses**

	NPTEL/VTU Online Open Elective Courses - I			
1Bxx704A	NPTEL/VTU Online Courses	1Bxx704C		NPTEL/VTU Online Courses
1Bxx704B	NPTEL/VTU Online Courses	1Bxx704D		NPTEL/VTU Online Courses
	NPTEL/VTU Online Professional Elective Course (Online Courses)-IV			
1Bxx801A	NPTEL/VTU Online Courses	1Bxx801C		NPTEL/VTU Online Courses
1Bxx801B	NPTEL/VTU Online Courses	1Bxx801D		NPTEL/VTU Online Courses
	NPTEL/VTU Online Open Elective Courses (Online Courses)-III			
1Bxx802A	NPTEL/VTU Online Courses	1Bxx802C		NPTEL/VTU Online Courses
1Bxx802B	NPTEL/VTU Online Courses	1Bxx802D		Foreign Language (NPTEL/MOOC/online VTU)

Types of Internships (Course Code: 1Bxx803)

Students shall undertake one of the following internship types during the eighth semester, as per academic guidelines:

1. **1Bxx803A – Industry Internship**: Shall involve practical exposure and training within an industrial or corporate setting.
2. **1Bxx803B – Research Internship**: Shall focus on academic or applied research under the guidance of faculty or research institutions.
3. **1Bxx803C – Post-Placement Internship**: Shall be undertaken by students who have secured placement, aligning with their future employment domain.
4. **1Bxx803D – Societal Internship**: Shall engage students in community-based or social impact projects with NGOs, government bodies, or civic organizations.
5. **1Bxx803E – Online Internship**: Shall be conducted through recognized digital platforms offering structured internship modules.
6. **1Bxx803F – Skill Enhancement Courses (SEC):** Shall be opted by students unable to secure internships, offering credit equivalence through curated online courses available at http:// www.online.vtu.ac.in

To ensure uniformity, quality, and transparency in the internship process, **VTU has launched a centralized web portal** that serves as a **single platform** for all internship opportunities. Reputed **industries, Centres of Excellence, Research Laboratories**, and other recognized bodies will be registered on this portal. **Students must choose internships exclusively through this portal**. **No other mode of internship selection will be permitted**.

Overview of Courses, Credits, Projects, and Internships under VTU Curriculum

I. Abbreviations used in the Scheme of Teaching and Examinations

Abbreviations	Expanded Form of the Abbreviations
AICTE	**All India Council of Technical Education**
NCrF	**National Credit Framework**
VTU	**Visvesvaraya Technological University**
AEC	Ability Enhancement Course
ASC	Applied Science Course
BSC	Basic Science Course
CIE	Continuous Internal Evaluation
CI	Classroom Instruction
CCA	Continuous Comprehensive Assessment
CGPA	Cumulative Grade Point Average
CUL	Cultural
COE	Centre for Online Education
HSMC	Humanities Studies and Management Course
IPCC	Integrated Professional Core Course
LI	Laboratory Instruction
L	Lecture
NCMC	Non-Credit Mandatory Course
NSS	National Service Scheme
NPTEL	National Programme for Technical Enhanced Learning
OEC	Open Elective (Interdepartmental or interdisciplinary) Course
PCC	Professional Core Course
PCCL	Professional Core Course Laboratory
PEC	Professional Elective Courses
PE	Physical Education

P	Practical
SEC	Skill Enhancement Courses
SEE	Semester End Evaluation
SL	Self-Learning
SGPA	Semester Grade Point Average
SWAYAM	Study Webs of Active-Learning for Young Aspiring Minds
TW	Term Work
T	Tutorial
VTU online	VTU online courses offered by Centre for Online Education,
YOG	Yoga

II. Credit Representation

1-hour Lecture (L) per week=1Credit

2-hoursTutorial(T) per week=1Credit

2-hours Practical / Drawing (P) per week=1Credit

Teaching & Learning Scheme

As per the new National Credit Framework (NCrF), 30 hours of learning of a student is considered equivalent to 1 credit. A semester is considered as a 14-week period of academic interaction with students. The learning components are categorized as follows:

1. **Classroom Instruction (CI):** Includes different instructional / implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts within the classroom measured in Number of hours per semester.
2. **Laboratory Instruction (LI):** Expressed as number of hours per semester which Includes experiments / practical performances / problem-based experiences in laboratory, workshop, field or other locations using different instructional / Implementation strategies.
3. **Term work (TW):** Includes assignments, seminars, presentations, case studies, micro projects, field activities, industrial visits, academic preparation duration and any other student activities in Number of hours per semester.
4. **Self-Learning (SL):** MOOCs (SWAYAM/NPTEL/Industry certified courses), spoken tutorials, online educational resources, self-initiated projects, Learning through digital resources etc in Number of hours per semester. (If provided in curriculum structure).

	Course Details	
1.	**One Credit Theory Courses:**	
	Teaching-Learning sessions in a semester	14 hours
	Examination pattern for CIE and SEE	Multiple Choice Question (MCQ)
	Teaching hours per week - L:T:P	1:0:0
2.	**One Credit Laboratory Courses:**	
	Teaching-Learning sessions in a semester	28 hours (2 hours session /week)
	Examination pattern for CIE and SEE	Continuous assessments, lab Internal test and SEE
	Teaching hours per week - L:T:P	0:0:2
3.	**Two Credit Theory Courses:**	
	Teaching-Learning Sessions in a semester	28 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week - L:T:P	2:0:0
4.	**Three Credit ESC/ETC/PCC/PEC/OEC Courses:**	
	Teaching-Learning Sessions in a semester	42 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	3:0:0
5.	**Four Credit Program Core Courses (PCC):**	
	Teaching-Learning Sessions in a semester	56 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	4:0:0
6.	**Four Credit Integrated Professional Core Courses (IPCC):**	
	Teaching-Learning Sessions in a semester (Teaching sessions: 42 hours + Practical sessions: 28 hours)	70 hours
	Examination pattern for CIE and SEE	Descriptive

	Practical part of examination	CIE (No SEE).
	Teaching hours per week - L: T: P	3: 0: 2

III. Details of Courses

(1) Integrated Professional Core Course (IPCC): The Integrated Professional Core Course (IPCC) refers to a core theory course that is integrated with a laboratory of the same subject. Each IPCC carries 4 credits, with Teaching–Learning hours structured (L : T : P) as either (3:0:2). The theory component of the IPCC shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). The laboratory part shall be assessed exclusively through CIE, with no SEE. However, questions derived from the laboratory part may be included in the SEE question paper to ensure comprehensive evaluation

(2) Non-Credit Mandatory Courses (NCMC): are aimed at enhancing students' knowledge, skills, and awareness beyond the core curriculum. Successful completion of the NCMC is compulsory for fulfilling the requirements of the academic program. It shall not be considered for the computation of SGPA, CGPA and vertical progression. Each student shall register for the prescribed NCMC(s) in the prescribed semester. A student who fails to qualify in the prescribed NCMC shall not be eligible for the conferment of the degree.

(3) Professional Elective Courses (PEC): A professional elective course (PEC) is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum of the same discipline.

(4) Open Elective Courses (OEC): A open elective course (OEC) is a course offered by departments other than a student's parent department. These interdepartmental /interdisciplinary courses allow students to explore disciplines beyond their core area of study. These courses are intended to promote interdisciplinary learning, broad-based education, thereby enhancing a student's overall knowledge, creativity, and employability. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor/Proctor.

(5) Ability Enhancement Course Laboratory (AEC): An Ability Enhancement Course Laboratory is a practical, skill-oriented lab course designed to strengthen students' practical abilities, professional competencies that support communication, environmental awareness, computational thinking, interdisciplinary learning, and application skills through hands-on learning experiences.

The laboratory may pertain to disciplinary or interdisciplinary involving experiments, design tasks, and mini-projects aligned with current industry practices.

(6) Skill Enhancement Courses (SEC): These courses are intended to develop specific practical skills and competencies that improve students' employability, technical proficiency, and professional readiness to bridge the gap between academic and industry requirements. These courses emphasize hands-on training, application of theoretical knowledge, and development of discipline-relevant and transferable skills required in industry and society, and develop entrepreneurship and start-up skills.

(7) Online Courses: Online courses are educational programs delivered over the Internet through a digital platform, allowing students to access lessons, assignments, and discussions from anywhere at any time. Most online courses offer flexibility, allowing students to access materials and complete assignments on their own schedule. However, students have to pass the course within a stipulated period as per the norms of the university.

(8) VTU Online Courses: VTU Online courses are online courses offered by Centre of Online Education (COE) Mysuru. A wide range of multidisciplinary courses are available to learners anywhere, anytime to earn university-prescribed credits through proctored examination for the award of a degree.

(9) NPTEL/SWAYAM Online Courses: The National Programme on Technology Enhanced Learning (NPTEL)/SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) are the specific Indian platforms to host national Massive Open Online Courses (MOOCs). It offers online courses on a wide range of disciplines to learners anywhere, anytime, to earn university-prescribed credits through proctored examination for the award of a degree. All NPTEL/SWAYAM courses are MOOCs, but not all MOOCs are offered on these specific Indian platforms.

IV. **National Service Scheme / Physical Education / Yoga (NSS / PE / YOG):**

All students are required to register for any one of the following courses; National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), or Yoga (YOG)—with the respective course coordinator during the first week of the third semester.

- Colleges shall submit Continuous Internal Evaluation (CIE) marks for each semester based on the activities completed by students under the selected course.
- Students may opt for different activities/options across semesters. For instance, a student participating in PE during 3rd semester may choose NSS in the 4th semester or Yoga.
- Activities shall be conducted over two semesters (III & IV), and successful completion of the registered course / or courses along with the required CIE score is mandatory for the award of the degree.
- Institutions must ensure that events are appropriately scheduled and reflected in the semester-wise calendar for NSS, PE, Music, and Yoga activities.

These courses shall not be considered for the calculation of SGPA or CGPA and for vertical progression. However, completion of course(s) is compulsory for degree eligibility.

V. **Projects**

1. **Community Project**

A community is a social unit or group of people sharing socially-significant characteristics, such as place, set of norms, culture, religion, values, customs or identity. A community project involves addressing issues or needs within such a community or a network of entities working toward a common purpose. These projects may cover a wide range of areas, including welfare, sustainability, technology integration, and social development. Examples include establishing and maintaining an orphanage, implementing solar power generation and its maintenance, or developing environmental improvement solutions, etc. A community project is an experiential learning activity that encourages students to identify, analyse, and address real-life problems of the community using

engineering knowledge. It aims to promote social responsibility and civic engagement, interdisciplinary thinking and collaboration and practical application of theoretical concepts, thereby enabling students to contribute meaningfully to community welfare and sustainable development. Students can take up project individually or in a group not exceeding 4 students.

The evaluation shall be done as per the following;

CIE: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work shall be based on the rubrics.

SEE: SEE will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the rubrics.

2. Environmental Science Project

The Environmental Science Project is an applied learning component designed to develop students' awareness, understanding, and responsibility toward the environment. It provides an opportunity to study real-world environmental issues and apply scientific and engineering principles to design feasible and sustainable solutions.

The topics under environment include, but not limited to, climate change, biodiversity, air and water pollution, land use, excess use of natural resources, earthquakes, rise in the earth's temperature, power generation, soil erosion, environment issues related programmme, etc.

The project involves problem identification, field surveys, case studies, data collection, environmental audits, analysis, and proposal of remedial or preventive measures aimed at improving biodiversity, air quality, and thermal comfort, etc. Students can take up project individually or in a group not exceeding 4 students. Students can opt for Interdisciplinary Project based on their interest.

The evaluation shall be done as per the following;

CIE: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work, shall be based on the rubrics.

SEE: SEE will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the rubrics.

3. Hackathon Based Project (Academic)

The term hackathon is derived from the combination of hack (referring to clever problem-solving, not illegal activity) and marathon, which denotes an arduous (i.e., difficult) intellectual task requiring sustained effort, endurance, and mental resilience. The meaning of a hackathon varies depending on the specific context and intent. In an academic context, a hackathon can be considered to involve several concepts, ranging from resourceful, unconventional approaches to problem-solving.

Though a hackathon is an event, typically lasting for a few days to address a specific challenge, for academic purposes, it is conducted as a noncompetitive semester-long activity. The evaluation is done as and when the project is completed, by a panel of industry experts.

The hackathons not only help participants develop skills like problem-solving, critical thinking, creativity, teamwork, communication and time management, but also foster indigenous technology development, promote innovation and entrepreneurship, and contribute to non-formal learning and skill enhancement.

Students can take up a hackathon project individually or in a group of not exceeding 4 students.

The respective **BoS will announce** the problem statements in the beginning of the 5th semester. The topic selected can be discipline specific, interdepartmental, industrial, social (refers to immediate human relations, interactions, and individual behaviour within a community), societal (describes larger, general issues, institutions, and structures that define society as a whole), environmental, health, financial, or innovative in nature, leading to development of a working prototype, application, or product.

Hackathon projects are aligned with the principles of Outcome-Based Education (OBE) and support the objectives of innovation, skill development, and experiential learning in engineering education.

Projects shall be evaluated by industry experts, based on creativity, problem-solving approach, teamwork, and possible implementation, as far as possible, as and when the project is completed.

The evaluation shall be done as per the following;

CIE: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide. The CIE marks awarded for the project work, shall be based on the rubrics.

SEE: SEE will be conducted by the industry experts appointed by the Head of the Institute/University. The SEE marks awarded for the project work shall be based on the rubrics.

4. Capstone Project

The Capstone project is a comprehensive, year-long project carried out in two phases during 6th and 7th semesters of the undergraduate engineering/technology program. It integrates knowledge and skills acquired from multiple courses and disciplines to address a complex, real-world problem.

This project provides students with an opportunity to apply scientific principles, engineering methodologies, and technological tools to conceive, design, implement and evaluate an engineering solution. It serves as a culminating academic experience to demonstrate program outcomes, including problem-solving ability, teamwork, communication skills, and practical application of engineering principles. Students can take up project individually or in a group not exceeding 4 students. The group may have students from the same discipline and drawn from different disciplines.

Types of Capstone Projects:

Capstone projects undertaken for one year may fall into one or more of the following categories:

a) **Research-Oriented Projects :**

- Focus on investigating new concepts, theories, or technologies.
- Aim to generate new knowledge or contribute to academic research.

b) **Experimental/Analytical Projects**

- Based on laboratory or field experiments to validate a hypothesis or study a phenomenon.
- Including detailed data collection, analysis, and interpretation.

c) **Simulation/Modelling Projects**

- Use computational tools to model, simulate, and predict system behaviour.
- Reduce the need for physical prototyping in the initial stages.

d) **Industrial/Industry-Sponsored Projects**

- Carried out in collaboration with an industry partner.

- Address real-world engineering problems faced by the organization.

e) **Interdisciplinary/Multidisciplinary Projects**

- Combine knowledge and techniques from multiple engineering domains or other fields such as management, medicine, or environmental sciences.

f) **Entrepreneurial/Innovation Projects**

- Focus on product or service innovation with potential for commercialization.
- Include aspects of market analysis, cost estimation, and business planning.

Phase I Evaluation: Capstone Project Phase-I shall have only Continuous Internal Evaluation (CIE). In case disciplinary capstone project, the CIE shall be conducted by the **Departmental Project Review Committee**, which consists of a Senior Professor, the Project Guide, and one additional faculty member appointed by the principal for projects within the **parent discipline**.

For **Interdisciplinary Projects**, the Project Review Committee will consist of one Senior Professor, the department and interdepartmental Project Guides and one faculty member from a department related to the interdisciplinary project. The committee members are appointed by the principal of the college.

Phase-I evaluation shall be based on **rubrics** designed to measure graduate attributes defined by NBA. Successful completion of Phase-I allows the student to proceed to **Phase-II**.

Phase II Evaluation:

CIE of Phase shall be evaluated as indicated with phase -I evaluation. The **SEE** shall be conducted by university-appointed examiners**.** The assessment shall be based on **rubrics** designed to measure graduate attributes defined by NBA.

VI. Internship

Internship refers to the position of a student as trainee or a temporary (or unconfirmed) employee, who works in an organization, with or without pay, in order to gain work experience or satisfy requirements for a qualification. It is a structured, supervised professional experience in an industry, research organization, or community setting. Students taking up internship may be with or without stipend.

Internships play a vital role in bridging the gap between theoretical education and professional practice. In general, engineering internships serve as a crucial component of professional education by providing experiential learning, industry readiness, and holistic skill development, ultimately producing competent engineers or entrepreneurs. Apart from these, it develops professional ethics, work culture awareness and communication skills.

Some of the common types of internships are as follows:

i. **Industry Internship:** Carried out in the engineering industry, companies, manufacturing units, startups, business, IT industry. The topic involved may be technical, managerial, production-related tasks, live projects, or innovative activities.

ii. **Research Internship:** Carried out at universities, research labs, or R and D departments or organisations. The internship may involve literature review, data analysis, and experimental work leading to publications, prototypes, technical reports or innovations. The research internship may induce students to plan for higher studies or academic careers.

iii. **Academic or Teaching Internship:** Carried out at educational institutions. The students assist in academic activities, laboratory sessions or content development, and prepare or present report, presentation and student evaluation. The internship encourages interest in academia and pedagogy, develops new skills, helps to gain a competitive edge on the job market or for post-baccalaureate studies.

iv. **Community or Societal Internship:** Carried out with government schemes, or rural development projects, Non-Governmental Organisations (NGOs). The internship focused on social and community development activities promotes social responsibility, sustainable development awareness, encourages civic responsibility and ethical engagement.

v. **Entrepreneurship Internship:** Undertaken in association with start-ups, or entrepreneurship cells or launching own idea in Pre-Incubation/Incubation centres. The internship offers exposure to business planning, prototype product development, and promotes innovation, risk-taking, and entrepreneurial mindset.

vi. **Virtual or Remote or Online Internship:** Undertaken using online tools and digital collaboration platforms. Such internships are common in content writing, data science, marketing, and software development. It offers flexible learning environments and access to global opportunities, and allows participation in real projects without being physically present, from anywhere and anytime.

vii. **Government Internship:** Ministries, public sector units, or civic bodies offer such internships in policy research, administrative tasks, or public service projects. This internship is for students interested in governance or public administration.

viii. **Post-Placement Internship:** Refers to the internship offered to students after they receive a confirmed job offer (placement) from a company, but before formally joining as full-time employees. This internship (on-site, virtual, or hybrid) ensures that students are groomed to be professionally ready, technically competent, and culturally aligned with the organization even before official induction.

ix. **Skill Enhancement Internship:** Carried out at reputed organisations in offline or online mode. The aim of the internship is to expose to real-world tools, technologies, and professional environments to improve a student's employability by offering hands-on experience, application of theoretical concepts, and skill development aligned with current industry and technical trends. Skill Enhancement Internships, depending on focus area and scope, can be carried out at various organisations such as, Academic and Research Institutions, Industry and Corporate Settings, Government and Public Sector, NGOs and Social Enterprises.

For Skill Enhancement Internship topics refer to

https://online.vtu.ac.in/category/courses/Skill-Enhancement-Course.

Note on Internship for the Attention of Students and Colleges

- Placement training conducted at the college level, whether by third-party agencies, training institutes, or internal faculty, shall not be considered as internship for either a 15 week or a 30-week period.
- The official engagement period of 15-week or 30-week for students selected/recruited by the company/ organization only at their premises under the supervision of the company, shall only be considered as an internship.
- The period of training and working of students who have been recruited as employees by organisations at the beginning of the 4th year of the programme, shall also be treated as an internship.
- Students and colleges/institutions shall follow all the guidelines and procedures of the organization and the University's Internship Guidelines, and complete the internship within a period that matches with the VTU Calander and examination timetable.
- The assigned institution faculty mentor/ coordinator/guide should monitor the student's progress, and document offer letters, training reports, attendance, and evaluations for awarding academic credits.
- All students undergoing an internship, should adhere to all the guidelines, reporting protocols, and evaluation procedures prescribed by the University.
- Students must submit the certificate of completion of an internship with the period of internship clearly mentioned, from the respective company/organization.
- Colleges must submit details of students opting for internship during the odd and even semesters, along with a copy of the company selection letter, to the VTU when notified by the University.

Attention: In addition to the internship support provided by the college, students have the option to select internships through the AICTE and VTU Internship Portals. To ensure uniformity, quality, and transparency in the internship process, VTU has developed a dedicated web portal that serves as a single platform where colleges can also register companies offering internships. Every student is required to register on the portal before the commencement of their internship, and their progress will be monitored through the same platform.

As per VTU norms, the CIE shall be conducted based on the students' performance during the training program, assessed through **rubrics** from the company supervisor. The SEE evaluation shall be conducted by the college as per the examination timetable published by the VTU.

VII. Bridge Courses on Mathematics for Lateral Entry Students:

This courses can be taught in the **offline** mode by the faculty of the mathematics department of the college as per the normal procedure to the students. The students can attend the class at their college. All lateral entry students are required to **register** compulsorily for this course in the 3rd semester & 4th Semester and must appear for **CIE.** Passing in this course is **mandatory** for the award of the degree. Those who fail to secure the passing CIE marks, have to appear for the summer semester of the academic year or during subsequent odd semester. However, this course will not be considered for vertical progression, SGPA, and CGPA calculation.

VIII. AICTE Activity Points Requirement for BE/B.Tech. Programmes

As per AICTE guidelines (refer to Chapter 6 – *AICTE Activity Point Program, Model Internship Guidelines*), in addition to academic requirements, students must earn a specified number of **Activity Points** to be eligible for the award of the degree. The points to be earned are as follows:

1. **Regular students** admitted to a 4-year degree program must earn **100 Activity Points**.
2. **Lateral entry students** (joining from the second year) must earn **75 Activity Points**.
3. **Students transferred** from other universities directly into the fifth semester must earn **50 Activity Points** from the date of entry into VTU.

These Activity Points do not carry any credits, and therefore, the points are not considered for **the SGPA/CGPA** or for **vertical progression**. However, earning Activity Points is mandatory for the **award of the degree**, and the points earned will be reflected on the **eighth semester Grade Card**.

The hours spent earning the activity points will not be counted for regular attendance requirements. Students can accumulate these points at any time during their program period, including weekends, holidays, and vacations, starting from the year of admission, provided they meet the minimum hours of engagement prescribed for each activity by AICTE.

If a student completes all the semesters (eight/six) successfully, but fails to earn the required Activity Points, the eighth-semester Grade Card will be withheld until the Activity points requirement is fulfilled. Also, the degree will be awarded only after the Grade Card has been released.

IX. Option -1: Swappable Semester Scheme - A

To ensure equitable access to internship opportunities, provision has been made to swap seventh and eighth semesters under Scheme A. The details of the Scheme – A are as follows:

- Students who have an offer to enrol for a 15-week internship, before the start of 4th year, shall register for VIII semester courses instead of VII semester courses and take up respective semester examination.
- Those who have no offer to enrol to a 15-week internship, before the start of 4th year, shall register VII and VIII semesters courses in the chronological manner and complete the programme. In this case the internship shall be carried out during VIII semester.

X. Option -2: Two-Semester Internship Scheme – B

- Students who have cleared all the courses up to VI semester in first attempt only (i.e., students having no backlogs) and have an internship offer for a period of 180 working days or 30 working weeks, are only eligible for Scheme – B. The internship commence

date should coincide with the 4th year academic calendar of VTU. Such students, shall produce the confirmed internship letter, to the Principal/Academic Authority to get permission to register for the summer semester to opt for Scheme - B.

- Such eligibles students shall register for the course 1Bxx701 in the summer semester of the same academic year (i.e., after their VI semester) and complete the said course in first attempt only.
- In case, they absent for the examination or fails in the course 1Bxx701, they shall not be considered eligible for the Scheme – B. However, they shall register for Scheme – A.
- After completing the course 1Bxx701, students with confirmed internship letter to carry out the internship for a minimum 180 working days or 30 working weeks, shall register for the Scheme – B.
- In case students cannot commence the internship for various reasons, they not be considered for Scheme – B. In such cases, they shall register for Scheme – A. However, they will be exempted from studying the course 1Bxx701 again.
- A request letter with internship permission letter must be submitted to Registrar, VTU through concerned authorities of the institution. Only after receiving the approval from the Registrar, students proceed with the internship as mentioned in Option Scheme B.

Capstone Project Evaluation Guidelines for Students Opting for Internship for two semesters duration:

a) **Industry Internship Leading to Capstone Project:** For students opting for a two-semester Industry Internship that leads to the completion of the Capstone Project, the Phase-I evaluation will be conducted at the end of the VII semester, and the Phase-II evaluation will be conducted at the end of the VIII semester.

b) **Industry Internships Not Leading to Capstone Project:** For students opting for a Industry Internship that does **not** lead to the completion of the Capstone Project, they are required to undertake the Capstone Project separately. Both Phase-I and Phase-II of the Project Work must be completed as per the prescribed guidelines, under the guidance of a college-level guide or mentor.