

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 BIOTECHNOLOGY , 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	1BMAT301	Biostatistics and Biomodelling	TD /PSB: Mathematics/BT	51	05	0	64	120	3	50	50	100	4	
2	IPCC	1BBT302	Unit Operations + Lab	TD/PSB:BT	42	0	28	50	120	3	50	50	100	4	
3	PCC	1BBT303	Biochemistry	TD/PSB:BT	51	05	0	64	120	3	50	50	100	4	
4	PCC	1BBT304	Cell and Molecular Biology	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3	
5	PCC	1BBT305	Python Programming for life sciences	TD/PSB:BT/CS/IS	38	04	0	48	90	3	50	50	100	3	
6	PCCL	1BBTL306	Biochemistry lab	TD/PSB:BT	0	0	28	2	30	2	50	50	100	1	
7	AEC	1BBTL307x	Ability Enhancement Course Laboratory**	TD/PSB:BT	0	0	28	2	30	2	50	50	100	1	
8	SDC	1BCP308	Community Project (Project-Based Learning) / Societal Project	Respective Engineering Dept.	0	0	0	30	30	2	50	50	100	1	
9	NCCM	1BNSS309	National Service Scheme(NSS)	Campus	NSS coordinator	0	0	0	28	28	--	100	---	100	PP
		1BPE309	Physical Education(PE)(Sports and Athletics)		Physical Education Director										
		1BYOG309	Yoga		Yoga Teacher										
		1BMUK309	Music		Music Teacher										
Total											500	400	900	21	
10	NCCM	1BMATDIP310	Mathematics course for Lateral Entry Students	TD -Maths Dept/ VTU Online (COE). CIE by VTU online COE	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

V4/HB/KM/Dean/Overview of Courses, Credits, Projects, and Internships under VTU Curriculum-Details are listed on page number 11(onwards)

Ability Enhancement Course (Laboratory) 1BxxL307x			
1BBTL307A	Lab Safety & GLP (Good Laboratory Practices}	1BBTL307C	R programming for Biologists
1BBTL307B	Design of Experiments Lab (using relevant online tools)	1BBTL307D	Water analysis Lab
** 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 BIOTECHNOLOGY,
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	PCC	1BBT401	Bioprocess Principles & Stoichiometry	TD/PSB:BT	51	05	0	64	120	3	50	50	100	4	
2	IPCC	1BBT402	Microbiology +Lab	TD/PSB:BT	42	0	28	50	120	3	50	50	100	4	
3	PCC	1BBT403	Structural Biology & Bioanalytical techniques	TD/PSB:BT	51	05	0	64	120	3	50	50	100	4	
4	PCC	1BBT404	Cell culture techniques	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3	
5	PCCL	1BBTL405	Cell and Molecular Biology Lab	TD/PSB:BT	0	0	28	02	30	2	50	50	100	1	
6	AEC	1BBTL406	Ability Enhancement Course Laboratory**	TD/PSB:BT	0	0	28	02	30	2	50	50	100	1	
7	BSC	1BBT407	Programme Specific Biology AI & ML in Biotechnology	TD/PSB	38	04	0	48	90	3	50	50	100	3	
8	SDC	1BEP408	Environmental Science Project	TD/PSB	0	0	0	30	30	3	50	50	100	1	
9	NCMC	1BNSK409	National Service Scheme(NSS)	Campus	NSS Coordinator				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		500	400	900	21	
10	NCMC	1BMATDIP410	Mathematics course for Lateral Entry Students	TD -Maths Dept/ VTU Online (COE). CIE by VTU online COE	14	0	0	14	28	--	100	--	100	PP	
Total									626		600	400	1000	21	
Ability Enhancement Course (Laboratory) 1BxxL406x															
1BBTL406A		Patent Search, Data Analysis and Research Methodology Lab			1BBTL406C	Herbal Extraction techniques and Phytochemical Analysis lab									
1BBTL406B		AI & ML in Biotechnology lab			1BBTL406D	ANALYSIS OF DAIRY PRODUCTS LAB									
# 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 BIOTECHNOLOGY, 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	1BBT501	Bio-economy and Entrepreneurship	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
2	IPCC	1BBT502	Immunotechnology and Genetic Engineering +Lab	TD/PSB:BT	42	0	28	50	120	3	50	50	100	4
3	PCC	1BBT503	Genomics, Proteomics and Bioinformatics	TD/PSB:BT	51	05	0	64	120	3	50	50	100	4
4	PCC	1BBT504	Biokinetics and Bioreaction Engineering	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
5	PEC	1BBT505x	Professional Elective Course-I	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
6	BSC	1BRM506	Research Methodology and IPR						60	02	50	50	100	2
7	PCCL	1BBTL507	Bioinformatics Lab	TD/PSB	0	0	28	02	30	02	50	50	100	1
8	SDC	1BBT508	Hackathon-Based Project	CIE: By Departments SEE: Evaluation by industry experts					60	--	50	50	100	2
Total									630		400	400	800	22
# TH/S- Total Hours per Semester, TW& SL- Term Work & Self Learning														
Professional Elective Course-I														
1BBT505A		Food Processing and Nutraceuticals (include nutrigenomics)			1BBT505C		Medicinal Chemistry and Chemoinformatics							
1BBT505B		Forensic Biology			1BBT505D		Marine Bioresources and applications							

B.E. in BIOTECHNOLOGY														
Scheme of Teaching and Examinations-2025														
Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2025-26)														
VISEMESTER														
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	1BBT601	Bioprocess Control & Automation + Lab	TD/PSB:BT	42	0	28	50	120	3	50	50	100	4
2	PCC	1BBT602	Enzyme Technology	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
3	PCC	1BBT603	Bioprocess equipment design and CAED	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
4	PCC	1BBT604	Clinical and Pharmaceutical Biotechnology	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
5	PEC	1BBT605x	Professional Elective Courses-II	TD/PSB:BT	38	04	0	48	90	3	50	50	100	3
6	PCCL	1BBTL606	Enzyme Technology Lab	TD/PSB:BT	0	0	28	2	30	2	50	50	100	1
7	AEC	1BBTL607x	Ability Enhancement Course Laboratory	TD/PSB:BT	0	0	28	2	30	2	50	50	100	1
8	SDC	1BBT608	Capstone Project - Phase I	TD/PSB:BT					90	3	100	--	100	3
9	NCMC	1BBT609	Universal Human Value (VTU ONLINE Course)	CIE: By VTU online COE	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														
1BBT605A	Bioseparation techniques			1BBT605C	Biosensors & Biomimetics									
1BBT605B	Synthetic Biology and Tissue Engineering			1BBT605D	Systems Biology and Rational Drug design									
Ability Enhancement Course Laboratory**														
1BBTL607A	Plant Tissue Culture Techniques Lab			1BBTL607C	Modelling and Simulations in Biology Lab									
1BBTL607B	Python Programming for Biologists lab			1BBTL607D	Clinical Data management lab									
** 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).

**B.E. in BIOTECHNOLOGY,
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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	CI Marks	SEE Marks		Total Marks
					L	T	P							
1	IPCC	1BBT701	Bioprocess Engineering+ Lab	TD/PSB:BT	42	0	28	50	120	3	50	50	100	4
2	PEC	1BBT702x	Professional Elective Course-III	TD/PSB:BT	38	04	0	36	90	3	50	50	100	3
3	PEC	1BBT703x	Professional Elective Course -IV	TD/PSB:BT	38	04	0	36	90	3	50	50	100	3
4	OEC	1BBT704x	Open Elective Course-I	TD/PSB:BT	38	04	0	36	90	3	50	50	100	3
5	SDC	1BBT705	Capstone Project - Phase-II	TD/PSB:BT	0	0	0		210	3	100	100	200	7
6	NCMC	1BIKS706	Indian Knowledge System (VTU online Course)	VTU Online CoE, CIE: By COE	1	0	0		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														
1BBT702A	Sustainable Agri and Environmental BT			1BBT702C	Biopharmaceuticals and vaccine development									
1BBT702B	Bioproduct development and validation			1BBT702D	Nanobiotechnology									
Professional Elective Course-IV														
1BBT703A	Bioethics, Biosafety & Regulatory affairs			1BBT703C	Metabolic Engineering									
1BBT703B	Biomedical Imaging and Health Informatics			1BBT703D	Process Equipment & Plant Design									
Open Elective Course-I														
1BBT704A	Biomaterials and Medical Implants			1BBT704C	Biofuels and Bioenergy									
1BBT704B	Ecology and Ecosystem			1BBT704D	Foreign Language (NPTEL/SWAYAM/online VTU)									

B.E. in BIOTECHNOLOGY														
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	CIEMarks	SEE Marks	Total Marks	Credits
					L	T	P							
1	PEC	1BBT801x	Professional Elective-V (NPTEL/VTU Online Course)	Online Evaluation					90	3	50	50	100	3
2	OEC	1BBT802x	Open Elective-II (NPTEL/VTU Online Course)	Online Evaluation					90	3	50	50	100	3
3	SDC	1BBT803x	Internship (15 weeks or 90 working days)	--	--	--	--	--	360	3	100	100	200	9
Total									540	9	200	200	400	15
Professional Elective Course (Online courses)-V														
1BBT801A	NPTEL/VTU Online Course			1BBT801C	NPTEL/VTU Online Course									
1BBT801B	NPTEL/VTU Online Course			1BBT801D	NPTEL/VTU Online Course									
Open Elective Courses -II (Online Courses)														
1BBT802A	NPTEL/VTU Online Course			1BBT802C	NPTEL/VTU Online Course									
1BBT802B	NPTEL/VTU Online Course			1BBT802D	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](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 the title of the program
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-semester 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	CI Marks	SEE Marks		Total Marks
					L	T	P							
1	IPCC	1BBT701	To be completed in the Summer Semester after 6th semester							3	50	50	100	4
2	PEC	1BBT702x	Professional Elective Course-III (NPTEL/VTU Online Course)	Online Evaluation						--	50	50	100	3
3	PEC	1BBT703x	Professional Elective Course-IV (NPTEL/VTU Online Course)	Online Evaluation						--	50	50	100	3
4	OEC	1BBT704x	Open Elective Course (NPTEL/VTU Online course)-I	Online Evaluation						---	50	50	100	3
5	SDC	1BBT705	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	1BBT801x	Professional Elective-V (NPTEL/VTU Online Course)	Online Evaluation						---	50	50	100	3
2	OEC	1BBT802x	Open Elective-II (NPTEL/VTU Online Course)	Online Evaluation						---	50	50	100	3
3	SDC	1BBT803x	Internship (Two-semester internship for a minimum Period of 180 working days or -30 weeks)							3	50	50	100	12
Total										3	150	150	300	18
# 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									

1BBT703B	NPTEL/VTU Online Courses	1BBT704D	NPTEL/VTU Online Courses
NPTEL/VTU Online Open Elective Courses - I			
1BBT704A	NPTEL/VTU Online Courses	1BBT704C	NPTEL/VTU Online Courses
1BBT704B	NPTEL/VTU Online Courses	1BBT704D	NPTEL/VTU Online Courses
NPTEL/VTU Online Professional Elective Course (Online Courses)-IV			
1BBT801A	NPTEL/VTU Online Courses	1BBT801C	NPTEL/VTU Online Courses
1BBT801B	NPTEL/VTU Online Courses	1BBT801D	NPTEL/VTU Online Courses
NPTEL/VTU Online Open Elective Courses (Online Courses)-III			
1BBT802A	NPTEL/VTU Online Courses	1BBT802C	NPTEL/VTU Online Courses
1BBT802B	NPTEL/VTU Online Courses	1BBT802D	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](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**(A) Abbreviations Adopted in the Scheme of Teaching and Examinations**

Course		General Terms		General Terms	
Acronyms	Expanded Form	Acronyms	Expanded Form	Acronyms	Expanded Form
AEC	Ability Enhancement Course	AICTE	All India Council of Technical Education	YOG	Yoga
ASC	Applied Science Course	CCA	Continuous Comprehensive Assessment	P	Practical
BSC	Basic Science Course	CGPA	Cumulative Grade Point Average	SEE	Semester End Evaluation
HSMC	Humanities Studies and Management Course	CI	Classroom Instruction	SGPA	Semester Grade Point Average
IPCC	Integrated Professional Core Course	CIE	Continuous Internal Evaluation	SL	Self-Learning
NCMC	Non-Credit Mandatory Course	COE	Centre for Online Education	SWAYAM	Study Webs of Active-Learning for Young Aspiring Minds
OEC	Open Elective	CUL	Cultural	T	Tutorial
PCC	Professional Core Course	NCrF	National Credit Framework	TW	Term Work
PCCL	Professional Core Course	L	Lecture	VTU	Visvesvaraya
PEC	Professional Elective	LI	Laboratory Instruction	VTU online Course	VTU online courses offered by Centre for Online Education, Mysuru.
PE	Physical Education	NPTEL	National Programme for		
SEC	Skill Enhancement Courses	NSS	National Service Scheme		

(B)Academic Credit Framework in accordance with the National Credit Framework (NCrF)

The National Credit Framework (NCrF), introduced under India's education reforms, serves as an umbrella framework for the creditisation of learning across school education, higher education, vocational education, and experiential learning. NCrF credit levels are determined based on a combination of cumulative years of learning, the complexity of learning outcomes, and the rigor of assessment. These levels signify the degree of competence and complexity attained by the learner, progressing from foundational schooling to advanced doctoral research. Levels 1 to 4 correspond to school education up to the 12th standard, while Levels 4.5 to 8 correspond to higher education, ranging from the undergraduate level to the Ph.D. level.

In the earlier system, credits were primarily based on contact time (lecture hours per week × number of weeks per semester/year), assuming that learning is directly proportional to time spent in classroom instruction. However, the NCrF adopts a comprehensive and outcome-based approach by assigning credits to all forms of learning, including, (i) Classroom teaching, (ii)Laboratory work, (iii)Projects, (iv)Internships and apprenticeships, (v)Online and blended learning, (vi)Fieldwork and community engagement, (vii)Recognition of Prior Learning (RPL), (viii)Sports and arts activities, and (ix)On-the-job training.

Credits are thus based on notional learning hours, representing the total learner effort rather than only contact hours. This definition aligns Indian education with Global outcome-based credit systems, and international credit transfer practices [e.g., European Credit Transfer and Accumulation System (ECTS)-like frameworks]. According to NCrF, one academic year of learning is equal 1,200 notional learning hours (not a scientifically-validated law or psychological constant, but a policy design hours) and includes classroom teaching, self-study, assignments, projects, laboratory work, co-curricular and extra-curricular activities, internships, apprenticeships and other assessed learning experiences. For these 1,200 hours a student is expected to earn 40 credits, which means 1 credit corresponds to approximately 30 hours of academic learning. Although traditional university systems often equated 1 credit with approximately 13 to15 contact hours per semester, VTU, in alignment with NCrF, considers 14-weeks of structured academic interaction per semester with students is equivalent to approximately 30 notional hours per credit.

The learning methodologies include:

(i)Classroom Instruction (CI): Includes different instructional/implementation strategies, such as 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. (ii) 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. (iii)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. (iv)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).

VTU, in alignment with NCrF, considers 14-weeks of structured academic interaction per semester with students as equivalent to approximately 30 notional hours per credit.

Table below shows the credit structure, equivalent NCrF learning hours adopted by VTU:

Table 7.0.1 VTU adopted NCrF credit structure					
Particulars	Classroom Instruction (CI) in Hours per semester		Laboratory Instruction (LI) in Hours per semester	Term work (TW) and Self-Learning (SL) in Hours per semester	Total number of Teaching-Learning hours per semester
	L	T	P	TW + SL	
1 Credit theory course	14	-	-	16	30
1 Credit Practical course	-	-	28	02	30
2 Credit theory course	28	-	-	32	60
3 Credit theory course	42	-	-	48	90
3 Credit theory course with Tutorial	28	28	-	34	90
4 Credit theory course	56	-	-	64	120
4 Credit theory course with Tutorial	42	28	-	50	120
4 Credit Integrated Course	42	-	28	50	120
Project work	-	-	-	As per the type of project	
Internship	-	-	-	As per the type of Internship	

NCrF is designed to work with ABC for years, where, credits are digitally stored to accumulate, transfer, and redemption across institutions for vertical and horizontal mobility across sectors, which is essential for MEME.

(C) 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.
All NCMC courses are also offered by the Center of Online Education (CoE), Mysuru. The students may attend the offline courses conducted by the respective College/Institute or may attend the online video sessions available on online.vtu.ac.in. However, all CIE evaluations shall be conducted by the CoE, Mysuru before the last working day of the semester, and the CIE marks of the students shall be submitted directly to the Registrar (Evaluation), VTU, Belagavi.
- (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.
- (3) 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.
- (4) 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.
- (5) 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.

- (6) 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.
- (7) VTU Online Courses:** VTU Online Courses are online courses offered by the Centre of Online Education (COE), Mysuru. A wide range of multidisciplinary courses is made available to learners anytime and anywhere, enabling them to earn University-prescribed credits through duly conducted proctored examinations for the award of the degree.

NPTEL/SWAYAM courses adopted by VTU shall be offered in accordance with the NPTEL/SWAYAM course delivery framework, wherein teaching-learning is carried out through the online MOOC platform, assignments are administered periodically, and assessment is completed through a centrally conducted proctored examination as prescribed by the respective platform.

- (8) 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.

(D) 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.

(E)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 programme, 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.

(F) 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:

- 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.
- 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.
- 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.

- iv. **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.
- v. **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.
- vi. **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.
- vii. **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.
- viii. **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.
- ix. **Skill Enhancement Courses:** The courses offered on online.vtu.ac.in. Students who are unable to get the internship of their choice may opt for the courses offered under the Skill Enhancement Course category available at VTU Skill Enhancement Courses(<https://online.vtu.ac.in/category/courses/Skill-Enhancement-Course>). Students shall register for an appropriate number of courses such that the total credits earned are equivalent to the prescribed internship credit requirement.
- x. **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.

(F) Bridge Courses on Mathematics for Lateral Entry Students:

All lateral entry students are required to register compulsorily for this course in the 3rd semester and 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, must appear for the summer semester of the academic year. However, this course will not be considered for vertical progression, SGPA, and CGPA calculation.

These 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 or they can choose the **VTU online mode**, conducted by Centre for Online Education (COE) of VTU. Only CIE is only prescribed for this course and the CIE assessment is only by VTU online COE, and not at the institution level.

(G) 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,

V4/HB/KM/Dean/**Overview of Courses, Credits, Projects, and Internships under VTU Curriculum-Details are listed on page number 11(onwards)**

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.

The time spent to earn 20 activity points need not be from a single activity. It may be accumulated through a few activities covering 80 to 90 hours for 20 activity points and 400 to 450 hours for 100 activity points, 300 to 338 for 75 activity points, and 200 to 225 hours for 50 activity points.

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.

(H) Seventh (7) and Eight (8) Swappable Semester Schemes

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.

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 eligible students shall register for the course 1BEE701 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 are absent for the examination or fail in the course 1BEE701, they shall not be considered eligible for the Scheme – B. However, they shall register for Scheme – A.
- After completing the course 1BEE701, 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 shall not be considered for Scheme – B. In such cases, they shall register for Scheme – A. However, they will be exempted from studying the course 1BEE701 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.

(I) 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 an 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.

