Vel Tech

Rangarajan Dr. Sagunthala

R&D Institute of Science and Technology

(Deemed to be University Estd. u/s 3 of UGC Act, 1956)

Chennai, Tamil Nadu
India

B.Tech - Computer Science and Engineering (Cyber Security)

B.Tech (VTR UGE-21) - Curriculum

CBCS - Choice Based Credit System

School of Computing

B.Tech –COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY) PROGRAMME

CBCS CURRICULUM

Specialization / Honors

(With effect from 2022-2023)

Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

After the completion of the degree, graduates will

PEO1: Formulate, solve and analyze Computer Science and Engineering problems using necessary mathematical, Scientific and engineering fundamentals.

PEO2: Equip with fundamental knowledge to solve problems in the domain of Cyber security and Cyber forensics.

PEO3: Excel as software engineer in the specialized field of cyber security or continues higher education at a reputed institution in India or abroad.

PEO4: Demonstrate critical thinking, communication, teamwork, leader ship skills and ethical behaviour necessary to function productively and professionally.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including pr   ediction   and   modeling   to   complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO)

On successful completion of the program, the graduates will be able to,

PSO1: Develop the applications in various domains of computer science and engineering using appropriate algorithms and techniques.

PSO2: Use tools and techniques to provide secure solutions for offensive and defensive cyber security.

COURSE OUTCOMES (COs)

Abilities of the student defined in terms of Course Outcomes (COs) as per the Bloom's Taxanomy at the end of the every course in the programme.

B.Tech –Computer Science and Engineering (Cyber Security)
Curriculum
(CBCS)
Honors / Specialization
(With effect from 2022-2023)
Credits required for regular students in various course categories for
B.TechComputer Science and Engineering (Cyber Security)

Preamble:

B.Tech. CSE (Cyber Security) is designed to address the industry's increasing demand for skilled security professionals in the public and private sector, both in the Data Security and in the Network/Cloud Security domains. The programme covers core computer science subjects as well as Cyber Security specific courses. The emphasis of the program is to nurture students with the knowledge and skills required to secure computers, detect and analyze attacks and threats, respond to attacks, develop security policies, procedures, and standards.

The students shall earn 164 credits in various course categories given below for the award of degree of B.Tech (Computer Science and Engineering (Cyber Security)).

Course Category	Minimum Credits Required
Foundation Courses (FC)	56
Program Core (PC)	58
Program Elective (PE)	18
Open Elective (OE)	12
Independent Learning(IL)	14
Industry / Higher Institute Learning Interaction(IHL)	2
Professional Proficiency Courses (PPC)	4
TOTAL	**164**

Minimum credits required for regular students in various course categories for B.TechComputer Science and Engineering (Cyber Security)with minor

The students shall earn 164 credits in various course categories and additional 18 to 20 credits in the specialized tracks / areas from other branches/Schools by satisfying the prerequisite courses for the award of degree of B.TechComputer Science and Engineering (Cyber Security)with minor subject to the regulations.

Minimum credits required for regular students in various course categories for B.TechComputer Science and Engineering (Cyber Security)with Honors

The students shall earn 164 credits in various course categories and additional 18 to 20 credits in the specialized tracks / areas courses by satisfying the prerequisite courses for the award of degree of B.TechComputer Science and Engineering (Cyber Security)with Honors subject to the regulations.

Foundation Core (56 Credits)

Foundation courses enhance the knowledge, skills and attitude of UG engineering graduates of all programmes to the expected level. The foundation courses shall have the courses related to basic sciences and mathematics, basic engineering sciences and humanities and social sciences.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Subject Title	Category	L	T	P	C
Lecture Courses
1	10210MA101	Linear Algebra for Computing	BSC	3	1	0	4
2	10210MA102	Calculus & Ordinary differential Equations	BSC	3	1	0	4
3	10210MA103	Probability, Statistics and Queuing theory	BSC	3	1	0	4
4	10210MA110	Discrete Mathematical Structures	BSC	3	1	0	4
5	10210PH101	Semiconductor Physics	BSC	3	0	0	3
6	10210CH104	Environmental Science and Sustainability	BSC	3	0	0	3
7	10210CS101	Problem Solving using C	ESC	3	0	0	3
8	10210CS104	Python Programming	ESC	3	0	0	3
9	10210ME101	Design thinking	ESC	2	0	0	2
10	10210BM101	Biology for Engineers	ESC	2	0	0	2
11	10210ME103	Innovation & Entrepreneurship	ESC	2	0	0	2
12	10210ME102	Universal Human Values	HSC	3	0	0	3
13	10210ME104	Project Management & Finance	HSC	2	0	0	2
14	10210ME105	Engineers and Society	HSC	1	0	0	M
15	10210BL101	Constitution of India	HSC	1	0	0	M
Integrated Courses
16	10210EN201	Professional Communication - I	HSC	1	0	2	2
17	10210EN202	Professional Communication - II	HSC	1	0	2	2
18	10210EC201	Basic Electronics & Digital Logic Design	ESC	2	0	2	3
19	10210EE204	Introduction to Engineering	ESC	1	0	4	3
20	10210ME201	Engineering Graphics	ESC	1	0	4	3
Laboratory Courses
21	10210PH301	Modern Physics Laboratory	BSC	0	0	2	1
22	10210EE301	Engineering Products Lab	ESC	0	0	2	1

23	10210CS301	Problem Solving using C Lab	ESC	0	0	2	1
24	10210CS305	Python ProgrammingLab	ESC	0	0	2	1
		Total Credits					**56**

*BSC – Basic Science Courses, ESC – Engineering Science Courses, HSC – Humanities & Social Science Courses, M – Mandatory course

Program Core (58 Credits)

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
		Theory Courses				
1	10211CC101	Data Structures	3	1	0	3
2	10211CC103	Operating Systems	3	0	0	3
3	10211CC129	Modern Computer Architecture	3	0	0	3
4	10211CC130	Fundamentals of Computer Networks	3	0	0	3
5	10211CC106	Formal Languages and Automata Theory	3	1	0	3
6	10211CC107	Compiler Design	3	1	0	3
7	10211CC109	Microprocessors	2	1	0	2
8	10211CC119	Cryptography and Network Security	3	1	0	3
		Integrated Courses				
9	10211CC202	Design and Analysis of Algorithms	3	1	2	4
10	10211CC204	Programming Using Java	3	0	2	4
11	10211CC207	Database Management Systems	3	1	2	4
12	10211CC208	Software Engineering	2	1	2	3
13	10211CC210	Big Data Analytics	3	0	2	4
14	10211CC212	Web and Mobile Application Development	3	0	2	4
15	10211CC219	Cyber Security	3	0	2	4
		Laboratory Courses				
16	10211CC301	Data Structures Laboratory	0	0	2	1
17	10211CC312	Fundamentals of Computer Networks Laboratory	0	0	2	1
18	10211CC304	Operating Systems Laboratory	0	0	2	1
19	10211CC305	Microprocessors Laboratory	0	0	2	1
20	10211CC306	Competitive Coding-I	0	0	2	1
21	10211CC307	Competitive Coding-II	0	0	2	1
22	10211CC310	IoT and Cloud Laboratory	0	0	2	1
23	10211CC313	Problem Solving Techniques	0	1	2	1
		Total Credits				**58**

Tutorial hour is not considered for credit calculation of the course

Program Electives (18 Credits)

ProgramElectives are the courses offered in the programme which covers depth and breadth. The students may register for appropriate electives offered in the programme based on their area of interest. One course under this category shall be taken from the list of approved MOOCs.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
		Cyber Security – Core Electives				
1	10212CC112	Cyber Security Policy, Law & Ethics*	3	0	0	3
2	10212CC119	Cryptography and Network Security	3	1	0	3
3	10212CC126	Information Security*	3	0	0	3
4	10212CC211	Artificial Intelligence Techniques*	3	0	2	4
5	10212CC219	Cyber Security	3	0	2	4
6	10212CC225	Ethical Hacking	3	0	2	4
7	10212CC226	Secure Coding *	3	0	2	4
8	10212CC228	Blockchain Technology *	2	0	2	3
9	10212CC229	IoT and Cloud Computing	3	0	2	4
10	10212CC230	Forensics in Cyber Security *	3	0	2	4
11	10212CC232	Vulnerability Analysis and Penetration Testing*	3	0	2	4
12	10212CC250	Identity Access Management	3	0	2	4
* The proposed course and the course content are subject to approval/ratification in the upcoming BoS meetings						

Open Electives (12 Credits)

Open electives are the courses offered across the schools to enhance the knowledge breadth and professional competency of the students. The students shall register for appropriate electives offered in other schools based on their area of interest. The courses offered under this category cover the interdisciplinary knowledge.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
1	XXX1	Course Name-1	3	0	0	3
2	XXX2	Course Name-1	3	0	0	3
3	XXX3	Course Name-1	3	0	0	3
4	XXX4	Course Name-1	3	0	0	3

* One of the courses may be completed through MOOCs Platform like NPTEL as described by the department.

These courses offered to the other departments/schools by School of Computing under Open Elective category.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
1	10213CC101	Object Oriented Programming using Java	3	0	0	3
2	10213CC102	Data Structures	3	0	0	3
3	10213CC103	Operating Systems	3	0	0	3
4	10213CC104	Database Management Systems	3	0	0	3
5	10213CC105	Computer Networks	3	0	0	3
6	10213CC106	Data warehousing and Data mining	3	0	0	3

The following courses are offered to the other departments/schools by School of Computing under Open Elective category. The students will solve the problems posted by Leet Code Platform, the grades will be offered based on the scores secured by the students by solving the problems posted in Leet Code Platform.

S.No	Course Code	Course Name	L	T	P	C
1	10213GE301	Programming Challenges	0	1	4	2

Independent Learning (14 Credits)

The students are expected to learn the courses offered under this category on their own. The courses offered under this category include:

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
1	10214CC601	Community Service Project	-	-	-	1
2	10214CC701	Minor Project	0	0	4	2
3	10214CC702	Minor Project	0	0	4	2
4	10214CC801	Major Project	-	-	-	9

Industry / Higher Institute Learning Interaction (2 Credits)

The students shall earn a minimum of two credits by undergoing internship and/or specialized courses.

1. **Internship:**
   The students shall undergo Internship in the industry/higher learning institute approved by Industry-Institute Interaction Cell (IIIC) during any time after the second academic year.

2. **Specialized Courses:**
   The students shall undergo the courses offered either by the industrial experts whose minimum academic qualification is Bachelor of Engineering or equivalent or faculty expert from higher learning institutions approved by IIIC. The students shall choose either one two credits course or one one credit course or two one credit courses.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
1	10215CC901	Internship	-	-	-	2
2	10215CC902	Industry Expert Lecture-1	-	-	-	1
3	10215CC903	Industry Expert Lecture-2	-	-	-	1
4	10215CC951	Higher Institute Learning Interaction-1	-	-	-	1
5	10215CC952	Higher Institute Learning Interaction-2	-	-	-	1

Professional Proficiency Courses (4 Credits)

The Professional Proficiency Courses which carry four credits, to be offered in four different semesters, starting from third semester. These courses offered in this category are relevant to professional proficiency.

L-Lecture, T-Tutorial, P-Practical, C-Credit

S.No	Course Code	Course Name	L	T	P	C
1	10216GE901	Soft Skill-I	2	0	0	1
2		Professional Proficiency Course-II	2	0	0	1
3		Professional Proficiency Course-III	2	0	0	1
4		Professional Proficiency Course-IV	2	0	0	1