Faculty Of Science, Technology & Architecture
School of Computer Science and Engineering

Department of Information Technology

Program Structure of B.Tech CSE (Cyber Security) [160 Credits]

Third Semester						Fourth Semester					
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MEE22XX[1]	Engineering Economics	3	0	0	3	MAS21XX	Statistics & Probability	3	0	0	3
MBB21XX	Management of Technology	3	0	0	3	ICS2201	Operating Systems	3	1	0	4
ICS2101	Computer System Architecture	3	0	0	3	ICS2202	Relational Database Management Systems	3	0	0	3
ICS2102	Data Structures and Algorithms	3	1	0	4	ICS2240	Number Theory and Cryptography	3	1	0	4
ICS2103	Cyber Security Essentials	3	1	0	4	ICS2220	Data Communication and Networks	3	1	0	4
ICS2120	Object-Oriented Programming	3	0	0	3	XXXXX	Open Elective 1	3	0	0	3
ICS2130	Data Structures and Algorithms Lab	0	0	2	1	ICS2230	Relational Database Management Systems Lab	0	0	2	1
ICS2131	Object-Oriented Programming Lab	0	0	2	1	ICS2231	Operating Systems Lab	0	0	2	1
ICS 2132	Cyber Security Essentials Lab	0	0	2	1	ICS2232	Data Communication and Networks Lab	0	0	2	1
ICS2170	Project-based Learning 1	0	0	2	1	ICS2270	Project-based Learning 2	0	0	2	1
	Total	18	3	6	24		Total	18	3	8	25
	Total Contact Hours (L+T+P)	27 Hours					Total Contact Hours (L+T+P)	29 Hours			
Fifth Semester						Sixth Semester					
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
ICS3101	Design and Analysis of Algorithms	3	1	0	4	ICS3201	Information and Network Security	3	1	0	4
ICS3102	Vulnerability Assessment and Penetration Testing	3	1	0	4	ICS3240	Machine Learning for Cyber Security [PE4]	3	0	0	3
ICS3120	Artificial Intelligence for	3	1	0	4	XXXXX	Program Elective 5	3	0	0	3

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[1]Statistics & Probability: CSE, AIML, SEEC students will take in 3rd semester. Engineering Economics: SIT, SCCE, All Core (-) SEEC will take in 3rd semester. In 4th semester, these courses are switched.

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	Cyber Security									
XXXXXX	Program Elective 2	3	0	0	3	XXXXX	Program Elective 6	3	0	0	3
XXXXXX	Program Elective 3	3	0	0	3	XXXXX	Open Elective 3	3	0	0	3
XXXXXX	Open Elective 2	3	0	0	3	ICS3210	Professional Practice	0	0	0	1
ICS3130	Design and Analysis of Algorithms Lab	0	0	2	1	ICS3230	Information and Network Security Lab	0	0	2	1
ICS3131	Vulnerability Assessment and Penetration Testing Lab	0	0	2	1	ICS3231/ICS3232	Digital Forensics Lab / Web Application Security Lab	0	0	2	1
ICS3170	Project-based Learning 3	0	0	2	1	ICS3270	Project-based Learning 4	0	0	6	3
	Total	18	3	6	24		Total	15	1	10	22
	Total Contact Hours (L+T+P)	27 Hours					Total Contact Hours (L+T+P)	26 Hours			

Seventh Semester						Eighth Semester					
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
XXXXXX	Program Elective 7	3	0	0	3	ICS4270	Major Project	0	0	0	12
XXXXXX	Program Elective 8	3	0	0	3						
XXXXXX	Open Elective 4	3	0	0	3						
XXXXXX	Open Elective 5	3	0	0	3						
ICS4170	Internship (Industry or Research)	0	0	0	1						
	Total	12	0	0	13		Total	0	0	0	12
	Total Contact Hours (L+T+P)	12 Hours					Total Contact Hours (L+T+P)				

A. Core Courses

1. ICS 2101 : Computer System Architecture   (Semester III)
2. ICS 2102 : Data Structures and Algorithms   (Semester III)
3. ICS 2103 : Cyber Security Essentials   (Semester III)
4. ICS 2201 : Operating Systems   (Semester IV)
5. ICS 2202 : Relational Database Management Systems   (Semester IV)
6. ICS 3101 : Design and Analysis of Algorithms   (Semester V)
7. ICS 3102 : Vulnerability Assessment and Penetration Testing (Semester V)
8. ICS 3201 : Information and Network Security   (Semester VI)

B. Flexible Core Courses

1. Flexible Core 1 : ICS 2120 : Object-Oriented Programming   (Semester III)
2. Flexible Core 2 : ICS 2220 : Data Communications and networks   (Semester IV)
3. Flexible Core 3 : ICS 3120 : Artificial Intelligence for Cyber Security (Semester IV)

C. Program Electives

Program Electives			
Semester IV	Semester V	Semester VI	Semester VII

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Program Elective 1	Program Elective 2	Program Elective 4	Program Elective 7
• ICS 2240 : Number Theory and Cryptography	• ICS 3140 : IoT Security • ICS 3141 : Block Chain Technologies • ICS 3142 : Theory of Computation **Program Elective 3** • ICS 3143 : Secure Coding • ICS 3144 : Cloud Security • ICS 3145 : Software Engineering	• ICS 3240 : Machine Learning for Cyber Security **Program Elective 5** • ICS 3242 : Digital Forensics • ICS 3243 : Web Application Security **Program Elective 6** • ICS 3244 : Database Security • ICS 3245 : Android Security	• ICS 4140 : Quantum Computing and Security • ICS 4141 : Cyber Laws and Polices **Program Elective 8** • ICS 4142 : Deep Learning • ICS 4143 : Soft Computing Techniques • ICS 4144 : Compiler Design

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Program Structure of B.Tech (Hons.) CSE (Cyber Security) [178 Credits] Programs

Third Semester					Fourth Semester				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C

Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
MEE22XX[2]	Engineering Economics	3	0	0	3	MAS21XX	Statistics & Probability	3	0	0	3
MBB21XX	Management of Technology	3	0	0	3	ICS2201	Operating Systems	3	1	0	4
ICS2101	Computer System Architecture	3	0	0	3	ICS2202	Relational Database Management Systems	3	0	0	3
ICS2102	Data Structures and Algorithms	3	1	0	4	ICS2240	Number Theory and Cryptography	3	1	0	4
ICS2103	Cyber Security Essentials	3	1	0	4	ICS2220	Data Communication and Networks	3	1	0	4
ICS2120	Object-Oriented Programming	3	0	0	3	XXXXX	Open Elective 1	3	0	0	3
ICS2130	Data Structures and Algorithms Lab	0	0	2	1	ICS2230	Relational Database Management Systems Lab	0	0	2	1
ICS2131	Object-Oriented Programming Lab	0	0	2	1	ICS2231	Operating Systems Lab	0	0	2	1
ICS2132	Cyber Security Essentials Lab	0	0	2	1	ICS2232	Data Communication and Networks Lab	0	0	2	1
ICS2170	Project-based Learning 1	0	0	2	1	ICS2270	Project-based Learning 2	0	0	2	1
	Total	18	3	6	24		Total	18	3	8	25
	Total Contact Hours (L+T+P)	27 Hours					Total Contact Hours (L+T+P)	29 Hours			

Fifth Semester						Sixth Semester					
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
ICS3101	Design and Analysis of Algorithms	3	1	0	4	ICS3201	Information and Network Security	3	1	0	4
ICS3102	Vulnerability Assessment and Penetration Testing	3	1	0	4	XXXXX	Machine Learning for Cyber Security	3	0	0	3
ICS3120	Artificial Intelligence for Cyber Security	3	1	0	4	XXXXX	Program Elective 5	3	0	0	3
XXXXXX	Program Elective 2	3	0	0	3	XXXXX	Program Elective 6	3	0	0	3
XXXXXX	Program Elective 3	3	0	0	3	XXXXX	Open Elective 3	3	0	0	3
XXXXXX	Open Elective 2	3	0	0	3	ICS3210	Professional Practice	0	0	0	1
ICS3130	Design and Analysis of Algorithms Lab	0	0	2	1	ICS3230	Information and Network Security Lab	0	0	2	1

[2] Statistics & Probability: CSE, AIML, SEEC students will take in 3rd semester. Engineering Economics: SIT, SCCE, All Core (-) SEEC will take in 3rd semester. In 4th semester, these courses are switched.

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Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
ICS3131	Vulnerability Assessment and Penetration Testing Lab	0	0	2	1	ICS3231/ICS3232	Digital Forensics Lab / Web Application Security Lab	0	0	2	1
ICS3170	Project-based Learning 3	0	0	2	1	ICS3270	Project-based Learning 4	0	0	6	3
ICS3180	Research Methodology	0	0	2	1	ICS3280	Malware Analysis	3	0	0	3
	Total	18	3	8	25		Total	18	1	10	25
	Total Contact Hours (L+T+P)	29 Hours					Total Contact Hours (L+T+P)	29 Hours			
	Seventh Semester						**Eighth Semester**				
Code	Subject Name	L	T	P	C	Code	Subject Name	L	T	P	C
XXXXXX	Program Elective 7	3	0	0	3	ICS4270	Major Project	0	0	0	12
XXXXXX	Program Elective 8	3	0	0	3	ICS4280	Honors Project	0	0	0	8
XXXXXX	Open Elective 4	3	0	0	3						
XXXXXX	Open Elective 5	3	0	0	3						
ICS4170	Internship (Industry or Research)	0	0	0	1						
ICS4180	Responsible AI and Ethical Hacking	3	0	0	3						
ICS4181	Intrusion Detection Systems	3	0	0	3						
	Total	18	0	0	19		Total	0	0	0	20
	Total Contact Hours (L+T+P)	18 Hours					Total Contact Hours (L+T+P)				

D. Core Courses

9. ICS 2101 : Computer System Architecture (Semester III)
10. ICS 2102 : Data Structures and Algorithms (Semester III)
11. ICS 2103 : Cyber Security Essentials (Semester III)
12. ICS 2201 : Operating Systems (Semester IV)
13. ICS 2202 : Relational Database Management Systems (Semester IV)
14. ICS 3101 : Design and Analysis of Algorithms (Semester V)
15. ICS 3102 : Vulnerability Assessment and Penetration Testing (Semester V)
16. ICS 3201 : Information and Network Security (Semester VI)

E. Flexible Core Courses

4. Flexible Core 1 : ICS 2120 : Object-Oriented Programming (Semester III)
5. Flexible Core 2 : ICS 2220 : Data Communications and Networks (Semester IV)
6. Flexible Core 3 : ICS 3120 : Artificial Intelligence for Cyber Security (Semester IV)

F. Program Electives

Program Electives			
Semester IV	Semester V	Semester VI	Semester VII
Program Elective 1 • ICS 2240 : Number Theory and Cryptography	**Program Elective 2** • ICS 3140 : IoT Security • ICS 3141 : Block Chain Technologies	**Program Elective 4** • ICS 3240 : Machine Learning for Cyber Security	**Program Elective 7** • ICS 4140 : Quantum Computing and Security

• ICS 3142: Theory of Computation **Program Elective 3** • ICS 3143 : Secure Coding • ICS 3144 : Cloud Security • ICS 3145 : Software Engineering	**Program Elective 5** • ICS 3242 : Digital Forensics • ICS 3243 : Web Application Security **Program Elective 6** • ICS 3244 : Database Security • ICS 3245 : Android Security	• ICS 4141 : Cyber Law and Polices **Program Elective 8** • ICS 4142 : Deep Learning • ICS 4143 : Soft Computing Techniques • ICS 3244 : Compiler Design

G. Honors Electives

1. ICS3180 : Research Methodology   (Semester V)
2. ICS3280 : Malware Analysis   (Semester VI)
3. ICS4180 : Responsible AI and Ethical Hacking   (Semester VII)
4. ICS4181 : Intrusion Detection Systems   (Semester VII)
5. ICS4280 : Honors Project   (Semester VIII)

Course syllabi of Second Year of B.Tech CSE (Cyber Security) and

B.Tech (Hons.) CSE (Cyber Security) Programs

Syllabus and Course Structure of Third Semester

S.No	Course Code	Course Name	L	T	P	C
1	MEE22XX	Engineering Economics	3	0	0	3
2	MBB21XX	Management of Technology	3	0	0	3
3	ICS2101	Computer System Architecture	3	0	0	4
4	ICS2102	Data Structures and Algorithms	3	1	0	4
5	ICS2103	Cyber Security Essentials	3	1	0	4
6	ICS2120	Object-Oriented Programming	3	1	0	4
7	ICS2130	Data Structures and Algorithms Lab	0	0	2	1
8	ICS2131	Object-Oriented Programming Lab	0	0	2	1
9	INT2170	Project-based Learning 1	0	0	2	1
		Total	18	4	6	24

ICS2101 Computer System Architecture [3 0 0 3]
Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess- 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and products of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization. **COMBINATIONAL CIRCUIT DESIGN: -** Design of Half and Full Adders, Half and Full Subtractors, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder. **SYNCHRONOUS SEQUENTIAL CIRCUITS**: Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register. **RTL and Micro Operations:** Register Transfer, Bus and Memory Transfer, Logic Micro Operations, Shift Micro Operations. **Basic Computer Organization:** Complete Computer Description & Design of Basic Computer, Instruction Codes, Computer Instructions, Timing & Control, Instruction Cycles, Memory Reference Instructions, Input/output & Interrupts; Control Unit: Hardwired vs. Micro Programmed Control Unit, **Central Processing Unit:** General Register Organization, Stack Organization, Instruction Format, Data Transfer & Manipulation, Program Control, RISC, CISC; **Computer Arithmetic**: Addition & Subtraction with

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