

**CHHATRAPATI SHAHU INSTITUTE OF
BUSINESS EDUCATION AND RESEARCH (CSIBER),
(AN AUTONOMOUS INSTITUTE)
UNIVERSITY ROAD, KOLHAPUR - 416 004 (M. S.), INDIA**



**STRUCTURE AND SYLLABUS OF
M.Sc.
(Computer Science in Cyber Security)
Faculty of Science – Under NEP 2020**

TO BE IMPLEMENTED FROM ACADEMIC YEAR- 2023-24

CURRICULUM OF M. SC. (Computer Science in Cyber Security) PROGRAMME

The M. Sc. (Computer Science in Cyber Security) Programme is of Two-year duration and is divided into four semesters. Semester I & II will be taught in the First Year of the programme and Semester III & IV during the second year of the programme with a provision of exit after completion of first year with Post Graduate Diploma in (Computer Science in Cyber Security) and also re-enter the same programme to Second year of M.Sc. (Computer Science in Cyber Security) to earn his / her Master's degree within five years from the date of admission to first year.

PROGRAMME OBJECTIVE:

To develop a comprehensive and advanced knowledge of Computer Science in Cyber Security there by enabling graduates to perform more effectively in the work place as well as to enhance their research capability.

ELIGIBILITY M.Sc.(Cyber Security):

1. A candidate for being eligible for admission to M.Sc. (Computer Science in Cyber Security) programme (Faculty of Science) must have passed under 10+2+3 pattern with any Science graduate level Examination of the Shivaji University or any other University recognized by A.I.U. (Association of Indian Universities) with minimum of 50% marks at the final year of examination are eligible to take admission to First year from the academic year 2023-24 and directly to second year, passed with four years of Graduation from the academic year 2027-28.
2. The admission to M.Sc.(Cyber Security) programme will be made on the basis of entrance test conducted by the Institute.

TOTAL INTAKE: 30

Reservation:

Reservation for special categories such as SC, ST, NT, OBC, etc. will be as per the prevailing rules & regulations of Government of Maharashtra.

Direct Admission to Second Year:

Students who have completed four years of Degree Programme can be admitted to directly second year of the PG Programme based on merit, depending upon availability of vacant seats.

DURATION:

M.Sc. (Computer Science in Cyber Security) is a full time programme of **TWO** Years duration. The programme consists of Four Semesters. The examination to be held in the First and Second Semester will be called Part – I (First Year) and the examination to be held in the Third and Fourth Semester will be called Part – II (Second Year)

If a candidate fails to clear all heads of passing within **FIVE** years of his/her registration, the past performance will stand automatically nullified.

If a candidate discontinues any of the terms (i.e. Semester – I to IV) on any account, will be allowed to complete the incompleted terms in the subsequent years subject to it is within the stipulated time duration of **FIVE** years.

In addition to the above, once a student's term (Semester) is granted, he/she shall be allowed to appear and pass in any of the subsequent examinations held, provided the examinations are within the stipulated period of **FIVE** years.

After taking the admission for FIRST YEAR and the Semester term (Semester – I and II) is NOT granted in this case the student has to seek fresh admission in the next year and complete the term and pass the examination also within **FIVE** years of his/her registration.

After taking the admission for SECOND YEAR and the Semester term (Semester – III and IV) is NOT granted in this case the student has to seek fresh admission in the next year and complete the term and pass the examination also within **FIVE** years of his/her registration.

Programme Completion with Break in Between:

A student who has passed M.Sc. (Computer Science in Cyber Security) – I and is seeking admission to M.Sc. (Computer Science in Cyber Security) – II after a long gap (Provided the gap lies within the stipulated duration of **FIVE** years) should complete the programme syllabus which is in existence at the time he has sought the admission for the second year.

Award of degree:

At the end of each semester credits earned by the students will be uploaded Academic Bank Credits (ABC) of each student. Student can earn **M. Sc.** (Computer Science in Cyber Security) degree on redemption of 88 earned credits or 44 credits for PG Diploma. After successful completion of four semesters of **M. Sc.** (Computer Science in Cyber Security) mark list ledgers will be forwarded to the Shivaji University for the award of Master's degree (minimum of 88 Credits) and PG Diploma after completion of first year (minimum of 44 Credits).

General features of the programme under NEP:

- a) New structure will be implemented with effect from Academic Year 2023-24
- b) Credits offered per Semester will be a Minimum of 20 and a Maximum of 22
- c) M. Sc. (Computer Science in Cyber Security) Programme is based on Major subjects.
- d) Electives selected in the M. Sc. (Computer Science in Cyber Security) are Relevant to OR Supportive of the Major Subject chosen.
- e) The exit option at the end of one year of the M. Sc. (Computer Science in Cyber Security) program will commence from AY 2024-25 with PG Diploma.

- f) The one-year M. Sc. (Computer Science in Cyber Security) Program will begin with effect from Academic Year 2027-28.
- g) Re-entry to complete the M. Sc. (Computer Science in Cyber Security), after taking the exit option, will be permissible up to 05 years from the date of admission to the program.

Credit Specification:

- i) Theory Course: A minimum of 15 hrs of teaching per credit is required in a semester.
- ii) Laboratory Course / Field Project: A minimum of 30 hrs in Laboratory activities per credit is required in a semester.

Outline of Programme Structure :

1. **Major Courses:** A course which should compulsorily be studied by a candidate as Core Course.
2. **Major Elective :** A course which should compulsorily be studied by a candidate which is in supportive of major course.
3. **Research Methodology :** Research Methodology course of 4 credits is Mandatory in the first semester.
4. **On Job Training (OJT) / Field Project :**
On Job Training as a part of Sem II of 4 credits (Equivalent to 120 hours) can be completed by the students in any industry/ Organization after completion of Sem I Examination i.e during the Diwali vacation (15 days) or Field Project of 4 credits can be completed under the supervision of departmental faculty member. This includes collection of field-based data, analysis, interpretation, referencing, report writing, etc. in the functional area. One full day in week i.e @ of 8 hrs per day for 15 days (120 hrs.) is dedicated to field-based project.
5. Research Project (RP) – I: Research Project – I, of 4 credits as a part of Semester III is designed to acquire special/advanced knowledge in the field of Environment or safety. Research Project (RP) is required to be completed by the student during the summer vacation over a period of 15 days (120 Hours) in any Industry / R & D organization under the supervision of a guide allotted by the Industry or Organization.
6. Research Project (RP) – II : Research Project (RP-Master Thesis) – II of 6 credits (180 Hrs) as a part of Semester IV is a research oriented work, and a candidate studies such a course on his with an advisory support by a teacher / faculty member.
7. Duration of each semester will be 15 weeks.

Credit Pattern:

Every course offered will have three components associated with the teaching-learning process of the course, namely

Lecture - L, Tutorial - T, Practice - P

Where, **L** stands for *Lecture* session, **T** stands for *Tutorial* Session consisting participatory discussion / self-study/

desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes and **P** stands for **Practice** Session and it consists of Hands on experience / Laboratory Experiments / Field Studies / Case studies that equip students to acquire the much required skill component.

M. Sc. (Computer Science in Cyber Security) consists of all the three components with weightage depending upon the paper.

If a course is of 4 credits, then the different credit distribution patterns in L: T: P format could be:

Theory Papers: 3: 0.5: 0.5

Practical: 1: 0: 3.0

Programme Outcomes

1. Conceptual Knowledge

Nurturing a foundation of comprehensive understanding and analytical thinking.

2. Research and Innovation

Fostering a spirit of research and innovation among students for formulating novel solutions.

3. Collaborative Learning

Imbibing collaboration and leadership skills for individual growth and collective empowerment.

4. Problem Solving and Critical Thinking

Developing critical thinking skills for problem solving and innovative solutions to meet dynamic challenges.

PSO

1. Proficiency in core computing domains

Exhibit proficiency in core computing domains in Computer Science with special relevance to security concepts through life long learning

2. Strategic planning for Secure Computational Systems

Apply sound theoretical knowledge and concepts to make the computational systems more secure.

3. Cutting-Edge Technologies and Security Tools Usage

Demonstrate requisite hands-on skills to work with a variety of security tools and frameworks in development of real life projects bearing social relevance and ethics.

4. Proficiency in Security Domain:

Design and development of secured applications for varied domains and platforms including best practices in user experience.

ASSESSMENT:

Taking into considerations of the UGC and AICTE requirements SIBER has adopted “Choice Based Credit System.” (CBCS). A course can be either full credit (4 credits) or half credit (2 credits). A full credit course shall be of 60 contact hours duration and a half credit course shall be of 30 contact hours duration.

For Theory paper of 100 marks (Four credits) the distribution of the marks will be as follows –

- Internal Marks i.e. Formative assessment - 40 Marks
- External Marks i.e. End of Semester examination - 60 marks

For Theory paper of 50 marks (Two credits) the distribution of the marks will be as follows –

- Internal Marks i.e. Formative assessment - 20 Marks
- External Marks i.e. End of Semester examination - 30 marks

Breakup of Internal Marks i.e. Formative assessment -

Sr. No.	Head	Full Credit	Half Credit
1.	Class Participation	10 Marks	05 Marks
2.	Objective Test(Minimum One Test Per Unit)	10 Marks	05 Marks
3.	Seminar /Book Review/ Home Assignment/ Class Assignment	10 Marks	05 Marks
4.	Case Study / Term Paper	10 Marks	05 Marks
	Total	40 Marks	20 Marks

The final internal marks will be calculated using the heads shown in above table. **The internal marks obtained by the student have to be disclosed and signed by the student.**

For Practical examination of 40 marks there shall be three questions of 15 marks each, the student has to attempt any two questions and 10 marks reserved for journal.

- Journal marks - 10 Marks
- Practical Marks i.e. End examination - 30 Marks

The practical examination should be considered as one head of passing i.e. 40 marks.

For the Field Project /Research Project Work of 100 marks, the distribution of the marks will be as follows –

- Internal Examiner - 30 Marks
- External Examiner - 30 Marks

Sem III – Internship Project Evaluation (4 credits)

Students are required to complete one month internship after Semester II examination and evaluation of the same will be at the end of Semester III. (4 credits)

End of Semester Evaluation (60 Marks)			
	Presentation	Viva	Marks
Internal Examiner	15	15	30
External Examiner	15	15	30
Total			60
Internal Evaluation (40 Marks)			
Project Report			10
Mentor evaluation based on attendance & Progress report			10
Industry Confidential Report			20
Total			40

Semester Integrated – Semester IV Research Project (Master Thesis) - 6 credit project work

Project group size – Max 3

End of Semester Evaluation (60 Marks)			
	Presentation	Viva	Marks
Internal Examiner	15	15	30
External Examiner	15	15	30
Total			60
Internal Evaluation (40 Marks)			
Attendance			10
Progress Report			10
Project Report			20
Total			40

For Theory Paper Assessment

1. The assessment of papers will be done by an Internal and External examiner. A difference of more than **20%** in the marks awarded by these examiners would necessitate the valuation of these papers by the Third examiner. The **‘nearest’** highest marks will be considered for determining the average mark of such papers.
2. Once the Student is passed in the internal head of passing (Formative assessment out of 40) in the report submitted to the examination department, the same should be carried forward whenever required.
3. The students who failed in the internal head of passing (Formative assessment out of 40) should reappear for the same and the revised marks will be considered for further calculation.
4. There shall be SEVEN questions of which Question No.1 shall be COMPULSORY and from question no. 2 to 7 student has to attempt any FOUR questions. Equal weightage should be given to each unit.

STANDARD OF PASSING:

1. In order to pass in each passing head, a candidate should obtain 50% in the internal marks (Formative assessment), 40% marks in theory, and minimum of 50% of the marks in aggregate in passing head.
2. To pass the M.Sc.(CS in Cyber Security). examination, a candidate will have to pass in all Four Semester in Two Parts i.e. Part – I (Semester – I to II) and Part – II (Semester – III & IV)
3. To pass the Project work / Seminar course/ Term paper a candidate must obtain a minimum of 50% of the total marks. If a candidate fails in the seminar / project report/ term paper and its viva-voce, he/she will be required to complete the particular seminar / project report/ term paper and its viva-voce as a fresh candidate in the subsequent year.
4. A candidate from first year M.Sc.(CS in Cyber Security) will be eligible to proceed to the semester III , if he/she is not having more than **THREE** courses backlog (25% of passing heads) from the first year (i.e. Semester I and II)
5. If student passed in the internal head (formative assessment) as well as theory examination but fails in aggregate (total) head of passing in that case student has to appear only for the theory examination.
6. If students fails in internal marks(formative assessment) and passed in the theory examination, in that case students has to complete the internal marks in next subsequent semester at that time student must clear the aggregate head of passing.
6. Semester Performance Index (SPI)/Cumulative Performance Index(CPI) will be as follows.

Grading System:**Full Credit 100 Marks****Grade Table for Trimester/Semester Examination**

Marks Obtained	Letter Grade	Grade Point
96-100	S+	10.0
91-95	S	9.0
86-90	E+	8.5
81-85	E	8.0
76-80	O+	7.5
71-75	O	7.0
66-70	A+	6.5
61-65	A	6.0
56-60	B+	5.5
50-55	B	5.0
--	X	0.0
--	XX	---

Half Credit 50 Marks**Grade Table for Trimester/Semester Examination**

Marks Obtained	Letter Grade	Grade Point
48 – 50	S+	10.0
46 – 47	S	9.0
43 – 45	E+	8.5
41 – 42	E	8.0
38 – 40	O+	7.5
36 – 37	O	7.0
33 – 35	A+	6.5
31 – 32	A	6.0
28 – 30	B+	5.5
25 – 27	B	5.0
--	X	0.0
--	XX	---

5. Final Result: For the final result of the student Cumulative Performance Index (CPI) based on total earned credits vis-à-vis total earned grade points shall be calculated will be as follows.

Total earned grade points / Total credits i.e. **88** credits.

Result		
CPI	Final Grade	Classification of Final Result.
9.0 – 10.0	E	Excellent
8.0 – 8.9	O	Out Standing
7.0 – 7.9	A+	Very Good
6.0 – 6.9	A	Good
5.5 – 5.9	B+	Average
5.0 – 5.4	B	Pass
0.0 – 4.9	X	Unsatisfactory (Fail)

Note: An aggregate of **5.0** credit points are required to pass the M.Sc. program.

CALCULATION OF PERFORMANCE INDICES:

A distinction of the performance of one student from the other student is rather impossible to carry out from the grades obtained by a student in all the courses taken by him in a semester/year. Hence, the evaluation of various courses is cumulated in two performance indices termed as semester performance index (SPI) and cumulative performance index (CPI), the explanation of which is given below:

Semester Performance Index (SPI):

The performance of a student in a semester is indicated by a number called Semester Performance Index (SPI). SPI is the weighted average of all the grade points obtained by him in all the courses registered during the semester. If G_i is a grade with numerical equivalent as G_i obtained by a student for the course with credit C_i then, SPI for that semester is calculated using formula.

$$SPI = \frac{\sum_i C_i G_i}{\sum_i C_i}$$

Where summation is for all the courses registered by a student in that Semester SPI is calculated to two decimal places and rounded off. SPI once calculated shall never be modified. Generally, for the students failed in regular examinations SPI is calculated only after the declaration of re-examination grades.

Cumulative Performance Index (CPI):

An up-to-date assessment of the overall performance of a student from the first semester till completion of the programme is obtained by calculating an index called as Cumulative Performance Index (CPI). The CPI is weighted average of the grades in all the courses registered by a student since the first semester of the programme.

$$CPI = \frac{\sum_i C_i g_i}{\sum_i C_i}$$

Besides SPI, CPI is also calculated at the end of every semester upto two decimal places and is rounded off. It is necessary to ensure that one course appears only once in calculation of CPI and the denominator in above equation does not exceed the total number of credits registered by him.

GRACE MARKS UNDER DIFFERENT ORDINANCE.

S.O. No. 1:- Grace Marks for Passing in each head of Passing (Theory/Practical/Oral/ Sessional/External).

The Examinee shall be given the benefit of grace marks only for passing in each head of Passing Theory/Practical/Oral/Sessional/ in External examination as follows.

Head of Passing	Grace Marks
Up to – 50	2
051-100	3
101-150	4
151-200	5
201-250	6
251-300	7
301-350	8
351-400	9
And 401 and above.	10

Provided that the benefit of such gracing marks in different heads of passing shall not exceed 1% of the aggregate marks in that examination.

Provided further that the benefit of gracing of Marks under this Ordinance shall be applicable only if the candidate passes the entire examination of Semester.

Provided further that this gracing is concurrent with the rules and guidelines of Professional statutory bodies at the All India level such as AICTE, UGC and Shivaji University etc.

S.O. No. 2:- Grace Marks for getting higher Class

A Candidate who passes in all the courses and heads of passing in the examination without the benefit of either gracing or condonation rules and whose total number of Marks falls short for securing Second Class/Higher Second Class or First Class by marks not more 1% of the aggregate marks of that examination or up to 10 marks, whichever is less, shall be given the required marks to get the next higher class of grade as the case may be.

Provided that benefits of above mentioned grace marks shall not be given, if the candidate fails to secure necessary passing marks in the aggregate head of passing also, if prescribed in the examination concerned.

Provided further that the benefits of above mentioned grace marks shall be given to the candidate for such examination/s only for which provision of award of class has been prescribed.

Provided further that this gracing is concurrent with the rules and guidelines of Professional statutory bodies at the All India level such as AICTE, UGC and Shivaji University etc.

S.O. No. 3 Condonation

If a candidate fails in more than one head of passing, his/her deficiency of marks in such head of passing may be condoned by not more than 1% at the aggregate marks of the examination. However condonation, whether in one head of passing or aggregate head of passing be restricted to maximum upto 10 marks only.

Condonation of deficiency of marks be shown in the statement of Marks in the form of asterisk and Ordinance number. Provided further that this gracing is concurrent with the rules and guidelines of Professional statutory bodies at the All India level such as AICTE, UGC and Shivaji University etc..

BACKLOG:

1. A candidate will be permitted to proceed to the second Semester even though he/she fails in one or more courses of the first semester, provided the first semester term is granted..
2. The students who have a backlog of not more than **THREE courses (25% of passing heads)** in the First year examination (Semester I & II) will be eligible to be admitted to the Second year (III Semester) of M.Sc. (Comp. Sci.)
3. A Candidate will be permitted to proceed to the Fourth Semester even though he/she fails in one or more courses of the third semester, provided the third semester term is granted.

M.Sc.(Computer Science(Cyber Security))
CHHATRPATI SHAHU INSTITUTE OF BUSINESS EDUCATION AND RESEARCH (CSIBER)
University Road, Kolhapur – 416 004
Out Line Theory Question paper for all the programmes
(Four Unit Course)

Class:

Course Name:

Paper no. :

Time: Three hours

Total marks: 60

INSTURUCTIONS:

1. Question no. 1 is **COMPULSORY**
2. Attempt any **ONE** from Q. No. 2 and Q. No. 3.
3. Attempt any **ONE** from Q. No. 4 and Q. No. 5.
4. Figures to right indicate **FULL** marks

		Marks
Q. 1)	Case Study	(20)
Q. 2)	Essay Type Question	(20)
OR		
Q. 3)	Essay Type Question	(20)
Q. 4)	a) Long Answer Question	(10)
	b) Long Answer Question	(10)
OR		
Q. 5)	a) Long Answer Question	(10)
	b) Long Answer Question	(10)

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M.Sc.(Computer Science(Cyber Security))
CHHATRPATI SHAHU INSTITUTE OF BUSINESS EDUCATION AND RESEARCH (CSIBER)
University Road, Kolhapur – 416 004
Out Line Theory Question paper for all the programmes
(Two Unit Course)

Class:

Course Name:

Time: Two hours

Paper no. :

Total marks: 30

INSTURUCTIONS:

1. Question no. 1 is **COMPULSORY**
2. Attempt any **ONE** from Q. No. 2 and Q. No. 3.
3. Attempt any **ONE** from Q. No. 4 and Q. No. 5.
4. Figures to right indicate **FULL** marks

		Marks
Q. 1)	Case Study	(10)
Q. 2)	Essay Type Question	(10)
OR		
Q. 3)	Essay Type Question	(10)
OR		
Q. 4)	Long Answer Question	(10)
Q. 5)	Long Answer Question	(10)

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CHHATRPATI SHAHU INSTITUTE OF BUSINESS EDUCATION AND RESEARCH (CSIBER)

University Road, Kolhapur – 416 004

NATURE OF PRACTICAL QUESTION PAPER

Time : 2 Hours

Total Marks : 40

Instructions:

1. **Attempt any TWO questions.**
2. **10 Marks are reserved for journal**

		Marks
Q. 1)	ONE LONG QUESTION / DIVIDE QUESTION INTO TWO BITS	(15)
Q. 2)	ONE LONG QUESTION / DIVIDE QUESTION INTO TWO BITS	(15)
Q. 3)	ONE LONG QUESTION / DIVIDE QUESTION INTO TWO BITS	(15)

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M.Sc. (Computer Science in Cyber Security) Course Structure (NEP 2020)**M. Sc. (Computer Science in Cyber Security) Part-I Semester I**

Course Code	Course Name	Credits	Contact hours	Int./Pract. Marks	EOS marks	Total Marks
MSEC-101	Operating System	4	60	40	60	100
MSEC-102	Secure C Programming (Lab)	4	60	40	60	100
MSEC-103	Web Design & Development (Lab)	4	60	40	60	100
MSEC-104	Design and Analysis of Algorithm	2	30	20	30	50
MSEC-105	Research Methodology	4	60	40	60	100
ELSEC-106	1 (a) Cloud Computing and Security 1 (b) Digital Forensic	4	60	40	60	100
	Total	22	330	220	330	550

M. Sc. (Computer Science in Cyber Security) Part-I Semester II

Course Code	Course Name	Credits	Contact hours	Int./Pract. Marks	EOS marks	Total Marks
MSEC-201	Database Management System	4	60	40	60	100
MSEC-202	Java Programming (Lab)	4	60	40	60	100
MSEC-203	Python Programming (Lab)	4	60	40	60	100
MSEC-204	Ethical Hacking	2	30	20	30	50
MSEC-205	Field Project	4	60	40	60	100
ELSEC-206	2 (a) Information Security and Cryptography 2 (b) Machine Learning Security	4	60	40	60	100
	Total	22	330	220	330	550

Exit option: PG Diploma (44 Credits) after successful completion of first year (Semester I and Semester II) of PG Degree

M. Sc. (Computer Science in Cyber Security) Part-II Semester III

Course Code	Course Name	Credits	Contact hours	Int./Pract. Marks	EOS marks	Total Marks
MSEC-301	Secure Software Design	4	60	40	60	100
MSEC-302	Linux Administration and Programming (Lab)	4	60	40	60	100
MSEC-303	Penetration Testing (Lab)	4	60	40	60	100
MSEC-304	IOT Security	2	30	20	30	50
MSEC-305	Internship Project & Viva	4	60	40	60	100
ELSEC-306	3 (a) Web Security 3 (b) Full Stack Web Development	4	60	40	60	100
	Total	22	330	220	330	550

M. Sc. (Computer Science in Cyber Security) Part-II Semester IV

Course Code	Course Name	Credits	Contact hours	Int./Pract. Marks	EOS marks	Total Marks
MSEC-401	Computer Communication Network	4	60	40	60	100
MSEC-402	Dot Net Programming (Lab)	4	60	40	60	100
MSEC-403	Block Chain (Lab)	4	60	40	60	100
MSEC-404	Research Project (Master Thesis)	6	180	40	60	100
ELSEC-405	4 (a) Mobile and Wireless Security 4 (b) Big Data Analytics	4	60	40	60	100
	Total	22	420	200	300	500