

ST. JOSEPH'S UNIVERSITY

BENGALURU-27



**DEPARTMENT OF COMPUTER SCIENCE AND COMPUTER
APPLICATIONS**

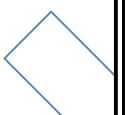
**SYLLABUS FOR POSTGRADUATE PROGRAMME
MSc (Artificial Intelligence and Cyber Security)**

For Batch 2024-2026 onwards



The objectives of the Programme are:

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software.
2. It helps students analyze the requirements for system development and exposes students to business software and information systems.
3. This course provides students with options to specialize in legacy application software, system software or mobile applications
4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the coding skills and the problem- solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to work effectively with a range of current, standard, Office Productivity software applications



Program Outcomes: MSc (Artificial Intelligence and Cyber Security) (2 Years) Degree

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
4. **Programming a computer:** Exhibiting strong coding skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
5. **Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop apps for applicative problems.
6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tools and techniques for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
7. **Communication and Soft Skills:** Students will acquire a reasonably good communication skill in both oral and written.
8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying the requirement in multidisciplinary fields.
9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrity in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
10. **Lifelong Learning:** Should become an independent learner. Thus, learn to learn unlearn and relearn.
11. **Motivation to take up Higher Studies:** Inspiration to continue education towards advanced studies in Computer Science.



| MSc (Cyber Security and Artificial Intelligence) | | | | | | | | |
|--|-------------|--|--------------------|-----------------------------|---------------------|--|-----------------------|-------------|
| <u>Semester I</u> | | | | | | | | |
| <u>Theory / Practical / Project</u> | Course Code | Course Title | Core / Elective | Number of Hours per week | Numberof credits | Continuous Internal Assessment (CIA) Marks | End Semester Marks | Total marks |
| Theory | MSCAICS11 | Design and Analysis of Algorithms | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS12 | Fundamentals of Information Security | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS13 | Introduction to AI & ML Using Python | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS14 | Advanced Operating Systems | Core | 04 | 04 | 50 | 50 | 100 |
| Practical | MSCAICS11P | Design and Analysis of Algorithms lab | Core | 06 | 03 | 25 | 25 | 50 |
| Practical | MSCAICS12P | Information Security Lab | Core | 03 | 1.5 | 25 | 25 | 50 |
| Practical | MSCAICS13P | Python Programming lab | Core | 03 | 1.5 | 25 | 25 | 50 |
| MOOC/SWAYAM/NPTEL | | | Core | 04 | 02 | 25 | 25 | 50 |
| Total | | | | 32 | 24 | 300 | 300 | 600 |
| <u>Semester II</u> | | | | | | | | |
| <u>Theory / Practical / Project</u> | Course Code | Course Title | Core / Elective | Number of Hours per week | Numberof credits | Continuous Internal Assessment (CIA) Marks | End Semester Marks | Total marks |
| Theory | MSCAICS21 | Machine Learning Algorithms and Techniques | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS22 | Network Security and | Core | 04 | 04 | 50 | 50 | 100 |

| | | | | | | | | |
|--|--------------------|---|----------------------------|-------------------------------------|------------------------------|---|-------------------------------|--------------------|
| | | Cryptography | | | | | | |
| Theory | MSCAICS23 | Digital Image Processing | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS24 | Big Data Analytics using Hadoop and Spark | Core | 04 | 04 | 50 | 50 | 100 |
| Practical | MSCAICS21P | Machine Learning Algorithms Lab | Core | 03 | 1.5 | 25 | 25 | 50 |
| Practical | MSCAICS22P | Network Security and Cryptography Lab | Core | 06 | 03 | 25 | 25 | 50 |
| Practical | MSCAICS23P | Image Processing Lab | Core | 03 | 1.5 | 25 | 25 | 50 |
| Total | | | | 28 | 22 | 275 | 275 | 550 |
| <u>Semester III</u> | | | | | | | | |
| <u>Theory / Practical / Project</u> | Course Code | Course Title | Core / Elective | Number of Hours per week | Number of credits | Continuous Internal Assessment (CIA) Marks | End Semester Marks | Total marks |
| Theory | MSCAICS31 | Natural Language Processing | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS32 | Cyber Law and Digital Forensics | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS33 | Cyber Criminology | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS34 | Department Elective | Elective | 04 | 04 | 50 | 50 | 100 |
| Practical | MSCAICS31P | Natural Language Processing Lab | Core | 06 | 03 | 25 | 25 | 50 |
| Practical | MSCAICS32P | Digital Forensics Lab | Core | 06 | 03 | 25 | 25 | 50 |

| | | | | | | | | |
|--|--------------------|--|----------------------------|-------------------------------------|-----------------------------|---|-------------------------------|--------------------|
| Practical | MSCAICS36P | Comprehensive Viva and Research Paper Presentation | Core | 04 | 04 | 25 | 25 | 50 |
| Total | | | | 32 | 26 | 275 | 275 | 550 |
| <u>Semester IV</u> | | | | | | | | |
| <u>Theory / Practical / Project</u> | Course Code | Course Title | Core / Elective | Number of Hours per week | Numberof credits | Continuous Internal Assessment (CIA) Marks | End Semester Marks | Total marks |
| Theory | MSCAICS41 | Ethical Hacking and Penetration Testing | Core | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS42 | Artificial Intelligence for Cybersecurity | Core | 04 | 04 | 50 | 50 | 100 |
| Project | MSCAICS43R | Industry Internship / Project Work | Core | 12 | 06 | 100 | 100 | 100 |
| Total | | | | 20 | 14 | 200 | 200 | 300 |

| | | | | | | | | |
|--------------------------------------|--------------------|-----------------------------------|----------------------------|-------------------------------------|-----------------------------|---|-------------------------------|--------------------|
| <u>Elective (Any one)</u> | | | | | | | | |
| <u>Theory / Practical</u> | Course Code | Course Title | Core / Elective | Number of Hours per week | Numberof credits | Continuous Internal Assessment (CIA) Marks | End Semester Marks | Total marks |
| Theory | MSCAICS34 | Deep Learning and Neural Networks | Elective | 04 | 04 | 50 | 50 | 100 |
| Theory | MSCAICS34 | Cloud Security and Virtualization | Elective | 04 | 04 | 50 | 50 | 100 |
| Total | | | | 04 | 04 | 50 | 50 | 100 |

EXAMINATION AND ASSESSMENTS

THEORY

1. **IA Weightage** 50%
2. **End Semester Examination Weightage** 50%

PRACTICAL/PROJECTS

1. **IA Weightage** 50 %
2. **End Semester Examination Weightage** 50 %

| Title | Credits | CA Marks | SE Marks | Total Marks | Time Duration for ESE |
|----------------------|---------|----------|----------|-------------|-----------------------|
| Core Subjects | 3 or 4 | 50 | 50 | 100 | 2 Hrs |
| Department Electives | 3 or 4 | 50 | 50 | 100 | 2 Hrs |
| Practicals | 3 | 25 | 25 | 50 | 2 Hrs |

QUESTION PAPER PATTERN CORE/DEPARTMENT ELECTIVE

The question papers of the theory examinations should follow the pattern specified below:

| Section | Marks for each question | Number Of Questions | | Total Marks |
|----------------------|-------------------------|---------------------|---------------|-------------|
| | | Total | Should Answer | |
| A | 1 | 5 | 5 | 5 |
| B | 3 | 7 | 5 | 15 |
| C (include subparts) | 10 | 4 | 3 | 30 |

Total Marks: 50

INTERNAL ASSESSMENT FORMAT

THEORY PAPERS (50 Marks)

ACTIVITY: 20 Marks

At least four activities will be conducted.

MID SEMESTER EXAMINATION: 25 Marks

The MSE for PG will be conducted two times for 25 marks for 4 credit courses, and is for 1hour duration, marksof both activity and MSE will be brought down to 50. 50% of the portion in the syllabus must be covered for the MSE.

Activity + MSE = 70 which is converted to 50

PRACTICALS (INTERNAL ASSESSMENT):

Every session will be evaluated for 25 marks in the following criteria:

1. **Writing the observation book** 10 marks
 2. **Executing the programs** 5 marks
 3. **Answering the viva voce** 5 marks
 4. **Record writing** 5 marks
- Total** 25 marks

PRACTICALS (EXTERNAL EXAMINATION):

End Semester Practical Examination will be evaluated for 25 marks in the following criteria:

| | | |
|-------|--------------------------------|----------|
| 1. | Writing two programs | 10 marks |
| 2. | Executing the two the programs | 10 marks |
| 3. | Answering the viva voce | 5 marks |
| Total | | 25 marks |

PROJECT LAB

Presentation / demo must be carried out in all the lab sessions in the whole semester for internal assessment of the project. In each lab session a student is evaluated for 25 marks.

Presentation /Demo

Viva Voce

Eligibility Criteria

Candidates from the Science Department can apply for **MSc in Artificial Intelligence and Cyber Security**. To be eligible for the **M.Sc. (Artificial Intelligence and Cyber Security)** programme provided by a number of institutions and affiliated colleges, students must possess a bachelor's degree in the pertinent field and satisfy the following requirements:

- Students must possess a bachelor's degree in a science-related field from an accredited university. Despite the fact that graduates with a [BCA](#) or a [BSc in Computer Science](#) are at an advantage.
- Students must achieve an aggregate of 50% grade points in a bachelor's degree.
- Candidates must pass both an entrance exam and a personal interview to get admitted to the college.