Computer Science Programme
Ashoka University
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Curriculum and Guidelines

Contents

1   About Computer Science Programme

Computer science impacts nearly every modern endeavor. The undergraduate CS curriculum at Ashoka has been designed to provide students with the flexibility to work across many disciplines. The curriculum identifies the fundamental skills and knowledge that all computer science graduates possesses while providing flexibility in selecting topics.

2   Computer Science Major Requirements (3-years)

To receive a B.Sc. degree with a Major in Computer Science at Ashoka University, students must accumulate 100 credit points at the end of three years. The course divisions and credit points requirement within three years for a Major in Computer Science are as follow:

- Foundation and Critical Thinking courses (28 credits)
  - The foundation courses are drawn from multiple disciplines - history, economics, English etc with the aim to provide students with a strong foundation in the humanities and liberal arts. Visit `https://ashoka.edu.in/page/undergraduate-academics-1#/section-52` for a complete description of foundation and co-curricular course requirements.
- Co-Curricular courses (4 credits)
- Computer Science Major courses (60 credits)
  - The course division for Computer Science Major courses is given below:
    1. The student must complete 10 core CS courses for 40 credits. The 10 courses are listed below.
    2. In addition to the 40 credits from core courses, students must take at least 20 credits of electives offered by the CS department.
- Other courses (8 credits)

2.1   Computer Science Core Courses

1. Discrete Math
2. Probability and Statistics
3. Introduction to Computer Programming
4. Computer Organization and Systems
5. Advanced Programming
6. Operating Systems
7. Algorithm Design and Analysis
8. Computer Networks
9. Introduction to Machine Learning
10. Programming language Design and Implementation

2.2   Computer Science Elective Courses

The list of computer science elective courses includes, but are not limited to,

1. Theory of Computation
2. Computer security and privacy
3. Introduction to Human Computer Interaction

4. Data Mining and Information Retrieval
5. Introduction to Data Bases
6. Unstructured Information Processing
7. Advanced Algorithms
8. Advanced Computer Architecture
9. Advanced Machine Learning
10. Linear Programming
11. Linear Algebra
12. Blockchain and Cryptocurrencies
13. Data driven Journalism
14. Networked and Social Systems
15. Information and Coding Theory
16. Computer Graphics
17. Software Engineering
18. Cyber Security
19. Distributed Systems
20. An Introduction to Computational Linguistics
21. Practice-oriented courses (Mobile phone platforms, cloud computing, etc.)

2.3 CS Major Example Path May Look Like This

- **1st Semester**
  - No CS courses
- **3rd Semester**
  - Probability and Statistics
  - Computer Organization and Systems
  - Advanced Programming
- **5th Semester**
  - Computer Networks
  - Introduction to Machine Learning
  - Programming Language Design and Implementation
  - CS Elective

- **2nd Semester**
  - Introduction to Computer Programming
  - Discrete Mathematics
- **4th Semester**
  - Algorithm Design and Analysis
  - Operating Systems
  - CS Elective
- **6th Semester**
  - CS Elective
  - CS Elective
  - CS Elective

3 Advanced Major in Computer Science: Curriculum Requirements

To graduate with a Postgraduate Diploma in Advaced Studies and Research (DipASR) in Computer Science at Ashoka University, students must accumulate 32 credit points at the end of one

year. The course divisions and credit points requirement DipASR in Computer Science are as follows,

1. A minimum of 32 credit points are required.
2. Of these 32 credits, a minimum of 16 credits must come from Computer Science courses.
3. Of these 16 credits, 4 credits must come from CS498: Capstone Project.

Some additional notes on the Capstone Project and the Capstone Thesis.

CS498: Capstone Project [4 Credits]:. A Capstone Project is done under the guidance of a faculty member and is aimed at encouraging a student to solve a complex problem. A Capstone Project is largely implementation focused. A final report describing the work done and a presentation are required.

CS499: Capstone Thesis [8 Credits]: *A Capstone Thesis is not mandatory.* Enrollment in Capstone Thesis requires the approval of a faculty member who will take into account one's performance in CS498 along with other aspects (including what is being proposed). A Capstone Thesis is largely research focused. Two copies of the thesis have to be submitted and a final presentation is required. The Dean will reimburse up to a maximum of Rs. 1000/- towards the cost of preparation of two copies of the thesis.

4 Computer Science Minor Requirements

In order to get a Minor in Computer Science, students are required to take 24 credits made up as follows,

- Introduction to Computer Programming, and
- Five more CS courses. Of these five, at least 3 of them must be from CS core courses list.

5 Interdisciplinary Majors

In order to Major in an interdisciplinary degree, students must accumulate 116 credit points at the end of three years - i.e., 16 credit points more than what is required for a pure Major.

The Computer Science department offers two interdisciplinary Majors - (i) Computer Science and Mathematics, and (ii) Computer Science and Entrepreneurship. The course divisions and credit points requirement within three years for these two Interdisciplinary Major are as follows,

1. Foundation and Critical Thinking courses (28 credits)
2. Interdisciplinary Major courses (76 credits)
3. Co-Curricular courses (4 credits)
4. Other courses (8 credits)

5.1 Computer Science and Mathematics

The course division between Computer Science and Mathematics department for this interdisciplinary Major is given below.

1. A minimum of 76 credit points of Interdisciplinary Major courses.
2. Of these 76 credits
    - A minimum of 36 credits must come from Computer Science department. Of these 36 credits, a minimum of 28 credits must come from "Computer Science core course list for CS+Math interdisciplinary Major". The core list is given below.

- A minimum of 36 credits must come from the Mathematics department. Of these 36 credits, a minimum of 28 credits must come from "Mathematics core course list for CS+Math interdisciplinary Major". The core list is given below.
- The remaining 4 credits can come from any Computer Science/Mathematics courses.

	Computer Science	Mathematics
Core Courses	Introduction to Computer Programing Computer Organization and Systems Algorithm Design and Analysis Computer Networks Introduction to Machine Learning Computer Security and Privacy Theory of Computation	Calculus I Linear Algebra Algebra I Probability Real Analysis Multivariable Calculus or Linear Programming Statistics

The core course list for Compute Science pure Major and Interdisciplinary CS-Math Major are not the same. Core courses for a pure Major include a course on "Probability and Statistics", but it is not included in the CS core list for Interdisciplinary Major.

The CS "Probability and Statistics" will not be considered as a replacement for the Math course "Probability". The only exception is if a student changes his/her major from a declared CS major to CS+Math interdisciplinary. In that case that student must have already completed the CS offered "Probability and Statistics" and therefore need not take the Math course "Probability" and instead take up another math course.

5.2 Computer Science and Entrepreneurship

For this interdisciplinary Major, students, in addition to 4 courses (16 credits) in the Entrepreneurship department, must complete all Computer Science pure Major requirements.

6 Computer Science Concentration

In order to get a Concentration in Computer Science, students are required to take any four (16 credits) Computer Science courses.