ASHOKA UNIVERSITY

Computer Science Handbook

GUIDELINES FOR STUDENTS

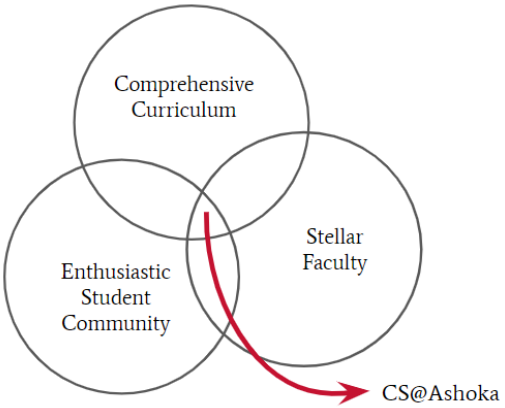
August 2023 Update

Content

Department of Computer Science

Introduction

The Department of Computer Science at Ashoka University acknowledges the increasing relevance of computing and information science to every academic discipline. In addition to classical and emerging areas of Computer Science, students have an opportunity to study interdisciplinary areas like computational biology, social and information networks, digital humanities and data-driven journalism. 3 interdisciplinary majors, a minor, a concentration are also offered by the Department in addition to an undergraduate major in Computer Science and a Ph.D. in Computer Science.



The goals of the programme include (but are not limited to):

- Impart a deep understanding of the foundations of Computer Science
- Enable a student to be able to systematically apply the foundational knowledge across disciplines
- Create new knowledge in the field of Computer Science

Programs Offered

- Undergraduate + ASP
  - Major
  - Interdisciplinary Majors
  - Advanced Major (ASP)
  - Minor/ Concentration
- PhD
- Graduate Assistantship
- Integrated MSc-PhD

Faculty and Research Interests

Permanent Faculty

- **Subhashis Banerjee**, Professor (HoD Computer Science)

  Machine Learning, Pattern Recognition, Computer Vision, Privacy
- **Manu Awasthi**, Associate Professor

  Computer Architecture, Operating Systems, and Computers & Society

- **Mahavir Jhawar**, Assistant Professor
  Cryptography, Block-chain and Network Security
- **Debayan Gupta**, Assistant Professor (ex-HoD)
  Secure Computation, Cryptography, and Privacy

Distinguished Faculty

- **Sudheendra Hangal**, Professor of the Practice in Computer Science
  Human-Computer Interaction, Social Media and Personal Digital Archives
- **Ryan S. Baker**, Director Penn Center for Learning Analytics
  Educational Data Mining, Learning Analytics
- **Ramesh Jain**, Director Institute for Future Health, University of California Irvine
  Computer Vision, Experiential Computing, Digital Health
- **Sundeep Juneja**, Senior Professor School of Technology and Computer Science, Tata Institute for Fundamental Research

Visiting Faculty

- Partha Pratim Das
- Gautam Shroff
- Raghavendra Singh
- Rintu Kutum
- Lipika Dey
- Goutam Paul

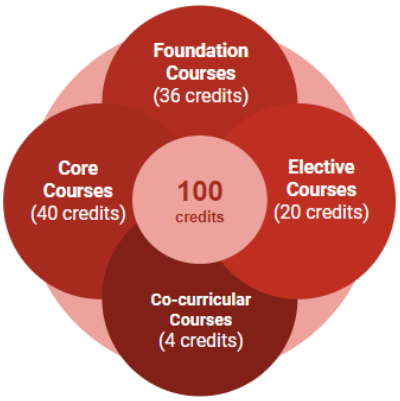
For a complete list of all faculty (core and visiting) and PhD students pursuing CS at Ashoka, visit the departmental website.

Curriculum

CS Major Requirements

NOTE - While our attempt is to provide the most accurate information, the CS curriculum at Ashoka is frequently updated to remain relevant. Thus, please confirm the requirements with the CS Representatives before taking any action.

To receive a B.Sc. (Hons.) 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 (36 credits)
- Co-Curricular courses (4 credits)
- Computer Science Major courses:
    - 10 compulsory core courses (40 credits)
    - A minimum of 20 credits of electives

Core Courses

These are the core courses you have to take to obtain a BSc. (Hons) in CS from Ashoka.

- Introduction to Computer Programming
- Discrete Math
- Probability and Statistics / Statistics for Economics
- Computer Organization and Systems
- Data Structures
- Operating Systems
- Algorithm Design and Analysis
- Computer Networks
- Introduction to Machine Learning
- Programming language Design and Implementation

Note: Probability and Statistics and Statistics for Economics will be treated equivalently by the department of computer science.

Electives

Here's a *non-exhaustive* list of popular CS Elective courses that have been offered at Ashoka:

- Computer Vision
- Theory of Computation
- Computer Security and Privacy
- Data Mining and Warehousing
- Database Management Systems
- Software Debugging
- Advanced Algorithms
- Advanced Computer Architecture
- Advanced Machine Learning
- Block-chain and Cryptocurrencies
- Distributed Systems
- Linear Algebra
- Cloud Computing

Note: ISMs count towards your electives, but there's a cap on the number of ISM credits that can contribute to your major requirements (8 credits).

Recommended Path

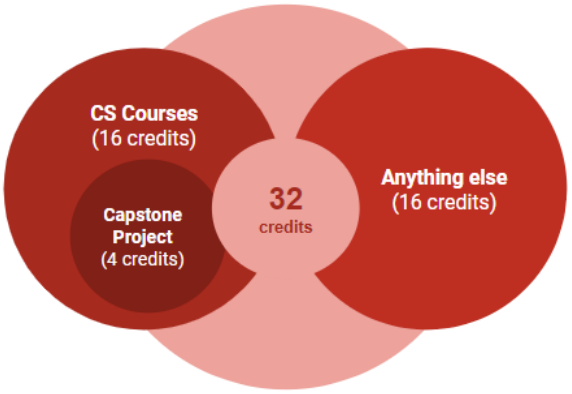
A CS Major's recommended path:

- 1st Semester
  - No CS courses
- 2nd Semester
  - Introduction to Computer Programming
  - Discrete Mathematics
- 3rd Semester
  - Probability and Statistics / Statistics for Economics
  - Computer Organization and Systems
  - Data Structures
- 4th Semester
  - Algorithm Design and Analysis
  - Operating Systems
  - CS Elective
- 5th Semester
  - Computer Networks
  - Introduction to Machine Learning
  - Programming Language Design and Implementation
  - CS Elective
- 6th Semester
  - CS Elective
  - CS Elective
  - CS Elective

Advanced Major in CS (ASP)

To graduate with a Postgraduate Diploma in Advanced 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 for a DipASR in Computer Science are as follows.

- A minimum of 32 credit points are required.
- Of these 32 credits, a minimum of 16 credits must come from Computer Science courses.
- 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.

- **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.

CS Minor Requirements

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

1. Introduction to Computer Programming (4 credits)
2. 3 CS core courses (3 x 4 = 12 credits)
3. Any 2 CS courses (2 x 2 = 8 credits)

Interdisciplinary Majors

In order to Major in an interdisciplinary program, students must accumulate **116 credit points** in three years. The Computer Science department offers three interdisciplinary Majors

- Computer Science and Mathematics
- Computer Science and Entrepreneurship
- Computer Science and Philosophy

The course divisions and credit points requirement within three years for these three Interdisciplinary Major are as follows:

- Foundation and Critical Thinking courses (36 credits)
- Interdisciplinary Major courses (76 credits)
- Co-Curricular courses (4 credits)

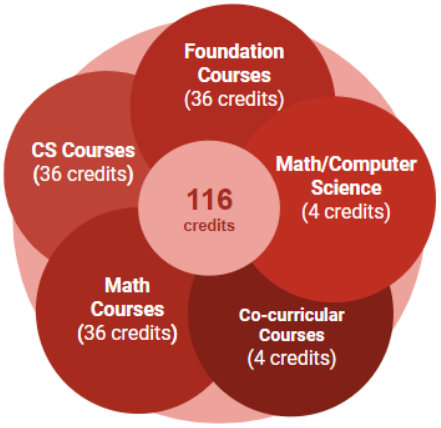
CS and Entrepreneurship

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

CS and Mathematics

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

- A minimum of 36 credits must come from the Computer Science department. Of these 36 credits, a minimum of 28 credits must come from the following “Computer Science course” list.
- A minimum of 36 credits must come from the Mathematics department. Of these 36 credits, a minimum of 28 credits must come from the following “Mathematics course” list.
- The remaining 4 credits can come from any Computer Science/Mathematics courses.



Computer Science

- Introduction to Computer Programming
- Computer Organization and

Systems
- Algorithm Design and Analysis
- Computer Networks
- Introduction to Machine Learning
- Computer Security and Privacy
- Theory of Computation

Mathematics

- Calculus
- Linear Algebra
- Algebra I
- Probability and Statistics
- Real Analysis
- Multivariable Calculus
- Statistical Inference

Recommended Path

A Computer Science and Mathematics interdisciplinary Major's recommended path:

- 1st Semester
  - FC
  - FC
  - FC
  - FC
- 2nd Semester
  - Introduction to Computer Programming
  - CS Elective I
  - Calculus
  - Linear Algebra
  - FC
- 3rd Semester
  - Probability and Statistics
  - Computer Organization and Systems
  - Algebra 1
  - FC
  - FC
- 4th Semester
  - Algorithm Design and Analysis
  - CS Elective II
  - Multivariable Calculus
  - Statistical Inference
  - FC
- 5th Semester
  - Computer Networks
  - Introduction to Machine Learning
  - Real Analysis
  - Math Elective I
  - FC
- 6th Semester
  - Theory of Computation
  - Computer Security and Privacy
  - Math Elective II
  - CS/Math Elective III

CS and Philosophy

Philosophy and Computer Science (PHICS) is an interdisciplinary major combining Philosophy and Computer Science. To major in PHICS students must complete the following 17 courses:

- PHI-1000: Introduction to Philosophy
- PHI-1060: Symbolic Logic
- CS-1101: Introduction to Computer Programming
- CS-1104: Discrete Mathematics
- CS-1216: Computer Organization and Systems
- CS-1205: Algorithm Design and Analysis
- CS-1309: Introduction to Machine Learning

- CS-1340: Computer Networks
- CS-1319: Programming Language, Design and Implementation
- CS-2349/PHI-2070 :Theory of Computation or Introduction to Computability Theory
- One course from between PHI-X600 and PHI-X829 (Ethics)
- One course from between PHI-X240 and PHI-PHI-X359 (Philosophy of Science, Math, or Language)
- Any three Philosophy courses
- Any two Computer Science courses

CS Concentration Requirements

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

Academic Opportunities

Study Abroad Programs

Note that, like any other program at Ashoka, the Study Abroad Programs are subject to changes. Kindly refer to the GESP website for the latest information. Additionally, contact the departmental HOD for further clarification regarding credit transfers.

Every summer, international summer schools offer undergraduate courses in different subjects and fields. These courses can be transferred (subject to faculty approval) to the total credits taken as Ashoka. The **Office of Global Education and Strategic Programmes (GESP)** is available to students for assistance and counseling in the application process.

Ashoka is currently partnered with **Wellesley College, UC Berkeley, University of Pennsylvania, Yale University, King's College London, University of Michigan, Penn Engineering, Sciences Po, and Trinity College Dublin**.

Students can also apply for **research and internship opportunities** abroad to get practical experience in their fields of interest through a competitive process. These opportunities are available in Lehigh University, NTU Singapore, Koç University etc. For any enquiries on the process of applying for a summer/semester abroad, kindly email **studyabroad@ashoka.edu.in**

Teaching Assistantships

As a TF/TA, you would be responsible for grading quizzes, holding discussion sessions and doubt clearing office hours, as well as helping with the logistics for classes. A prospective applicant can apply to TA for only those courses which they have already studied in Ashoka in the past. While preference may be given to seniors, anyone is welcome to apply for TAship.

Unlike in most other departments at Ashoka, students in the CS department **do not receive credits** for TAships; instead, they are **awarded a stipend** for their roles as TAs.

Independent Study Modules (ISM)

Independent Study Modules (ISM) are 2, 4, 6, or 8-credit research projects that provide students an opportunity to work closely with a faculty member. These projects can either be research that faculty members are already working on or any other research topic that students may be interested in. If interested, you can simply **approach a faculty** member through email prior to the start of the semester, requesting them for guidance through an ISM.

These count towards your electives, but there's a cap on the number of ISM credits that can contribute to your major requirements (8 credits).

Research Opportunities with Professors

If you are interested in CS Research, it is a great idea to start working as a **Research Assistant** (RA) under a faculty member. In order to do so, you will have to personally approach faculty members in their office hours and enquire whether you can assist them on current projects.

Before seeking RA roles, make sure to have prior knowledge about the research interests of your faculty member.

Awards and Recognition

- **Dean's List:** The Dean's List at Ashoka for any given semester includes the names of all students who, in the courses they have taken that semester, have scored a GPA of 3.65 or above. The Dean's List is awarded on a semester basis.

- **Latin Honors:** Students who have achieved scholastic distinction may be awarded the bachelor's degree with Latin honors at graduation. Honors appear on the official transcript and diploma. The criteria for these honors is as follows:
    a. **Cum Laude** (With Distinction) - GPA > 3.6
    b. **Magna Cum Laude** (With High Distinction) - GPA > 3.75
    c. **Summa Cum Laude** (With Highest Distinction) - GPA > 3.9

- **Academic Achievement Awards**: Gold, Silver and Bronze Awards are awarded respectively to the students attaining the Top 3 Major CGPAs during graduation.

- **Undergraduate Research Excellence Awards**: Awarded to the graduating student with the best track record in academic research, evaluated on the basis of publications and thesis quality.

- **Service Excellence Awards**: Awarded for extraordinary service in department building through various activities.

CS Clubs and Societies

The CS space at Ashoka is a vibrant hub that fosters a collaborative culture and a strong sense of community among computer science enthusiasts through various clubs and societies.

CS Society

The Computer Science Society at Ashoka University was founded in 2016 to strengthen the emerging CS culture on campus. It is an academic society that aims to create opportunities and resources for all students interested in this field through a host of activities.

The society successfully conducted **workshops** and an inter-university competition named **Decipher**, an adaptation of technical war games in the session 2022-23. Our prospective events include an **inter-university tech fest, frequent workshops and mentorship sessions, Research Reading Group sessions, intra-university competitions**, and discussions on developmental and research projects!

Contact email - **cs.society@ashoka.edu.in**

Women in Computing Society (WiCS)

Founded by an Ashoka alumnus, Simran Bhuria, and launched on campus by Mrs. Rashmi Mohan, an ACM eminent speaker on 29th September 2016, the Women in Computing Society is a group of passionate students dedicated to promoting a safer, healthier, and more inclusive computing culture and education. We constantly work towards building a larger community of womxn in CS that is collaborative and supportive.

As an academic society, we have organized a range of events and activities, including **Fireside Chats, Roundtable conversations, Research Reading Groups, Cryptic Hunts, Mixers, and Workshops** on various tools for research.

As a part of our larger vision of an inclusive community, we organize events focused on activism such as discussions and podcasts on gender in academic spaces and sexism, sessions on building confidence and tackling other challenges for women in STEM, and weekly workshops to increase tech literacy in the underprivileged students in Haryana, India.

We have also launched a **University-wide Alumni Mentorship Programme** for non-cis males in STEM this year. Currently, we are looking to raise awareness and stimulate discussions on interdisciplinary and emerging topics in computer science.

Contact email - **wics@ashoka.edu.in**

IEEE Ashoka Student Branch (IASB)

The IEEE Ashoka Student Branch (IASB) is a new addition to the STEM ecosystem of Ashoka - founded in 2023. The student branch, which falls under the Delhi Section of IEEE, was created to encourage, promote and reward distinction in the areas of computer science, biology and other domains of IEEE. Our mission is to help the student community acquire lasting skills that set them apart by providing various educational and fun-filled upskilling and professional events that span the STEM departments of Ashoka. Additionally, we offer the students of Ashoka an opportunity to tap into the vibrant and resourceful IEEE network of Professionals across the globe.

IASB conducts regular events that include **Hands-On Workshops** where students develop their technical skills, **Professional Events** where prominent scientific figures from the IEEE network are invited to interact with the Ashokan student community, **Study Sessions and academic help desk sessions**. We also aim to give back to the community around us by offering digital literacy sessions, online safety sessions and so much more to the service staff who work hard to keep us comfortable.

We look forward to providing scientific exposure that leads to the development of an enthusiastic and inclusive STEM audience in the Ashokan community. For further reference, check out IASB website: https://edu.ieee.org/in-ashoka/

Contact email - **ieee.asb@ashoka.edu.in**

Ashoka Data Society (ADS)

The Ashoka Data Society at Ashoka University is dedicated to all things data. Our mission is to further our students' knowledge and skills in the field of data science. We achieve this by connecting them with experienced professionals, offering **skill-enhancing courses**, and organizing exciting **competitions**. We have gained significant traction from the student body, enabling us to successfully host multiple events. We are excited about the students' enthusiasm for data science and remain committed to their continued learning and growth. Our aim is to create a vibrant community that fosters collaboration and innovation in the realm of data exploration.

Contact email - **ads@ashoka.edu.in**

Useful Contacts

- To contact any student (batch mate/senior/alumni) at Ashoka, it is convenient to use the Ashoka Email. The general syntax of one's email is **<firstname>.<lastname>_<batch>@ashoka.edu.in** and you can use this format to look up/contact anyone at Ashoka. Keep in mind that if one has multiple active email addresses, you will need to use your discretion, as follows:
    - If one has separate **asp** and **ug** emails, contact them on their latest email (i.e **asp** in this case). Similarly, contact alumni on their **alumni email ID**.
    - To make things easier for your TAs and TFs, make sure to **follow the guidelines** they provide when contacting them. These guidelines may include using specific subject lines, keywords, and other relevant information for course-related queries.

- If you don't know who to contact for anything remotely related to Computer Science, you should probably **contact the CS Representative** first. For the 2023-24 academic year, the CS Representatives are
    - **Bhumika Mittal**
    - **Gautam Ahuja**
    - **Gautam Yajaman**

  The best way to contact with CS Representatives is to reach out to them via emailing **cs.rep@ashoka.edu.in**

- All Ashoka faculty can be contacted using the Ashoka Email. Ashoka Staff have simpler email syntaxes, which in general is - **<firstname>.<lastname>@ashoka.edu.in**

- The Current CS HoD (Prof Subhashis Banerjee) can be reached out to, at **hod.cs@ashoka.edu.in**