

CS622: Advanced Computer Architecture

Lecture hours: MonTh 10:30 AM - 11:55AM

Venue: Lecture KD 102

Teaching Tools/Platforms

Class page: Link to lecture resources and other information

<https://cse.iitk.ac.in/users/deba/cs622/>

Piazza: All communications related to the course, discussion, Q/A

<https://piazza.com/iitk.ac.in/firstsemester2027/cs622/home>

Hello: To be used for assignment and grading

<https://hello.iitk.ac.in>

Meeting Hours

The scheduled office hour for the course is every Monday 12:15 PM - 1:30 PM. Students are encouraged to ask questions in the class Piazza page. One-on-one meetings can be scheduled on-a-need basis.

Prerequisite

UG course on Computer Organization, Operating Systems (for Masters and PhD. students). For IIT Kanpur UG students, CS220 and CS330 is a prerequisite. Good programming skills in C/C++. Exposure to large code bases, low level programming and debugging is desirable.

Course Contents

Single-threaded execution, traditional microprocessors, DLP, ILP, TLP, memory wall, Parallel programming and performance issues, Shared memory multiprocessors, Synchronization, small-scale symmetric multiprocessors on a snoopy bus, cache coherence on snoopy buses, Scalable multiprocessors, Directory-based cache coherence, Interconnection network, Memory consistency models, Privilege architecture (if time permits), Security issues (if time permits)

Drop policy

- *Last date of dropping the course is 20 Aug 2026*

Grading policy

Quizzes and Assignments (30%)

- Quizzes will be of two types—(i) in-class short quizzes, (ii) announced quizzes, typically conducted in labs
- Assignments: Take-home coding assignments and paper review followed by presentation

Project: 40%

- The project will be group based (maximum group size = 3). Form your project groups by 25 Aug 2026. If you are facing difficulties in finding project partners, contact the instructors/TAs.
- Project evaluation will be done in multiple phases—Interim presentation and final presentation followed by submission of a report. Final presentation and report (during the end-sem time frame) will be considered as the final examination for this course.

Mid-semester Examination: 30%

End-semester Examination: Project Report and Presentation

Course Policies

- Attend classes regularly. Slides may not contain everything discussed during the lectures. Moreover, you should not miss hands-on exposure through in-class exercises and quizzes.
- Do not be tempted to adopt any unfair means as it would result in serious repercussions. Please refer to the department Anti-Cheating policy page (<https://cse.iitk.ac.in/pages/AntiCheatingPolicy.html>)
- Switch off your mobile phones etc. during lecture hours

Books and References

1. John Hennessy and David Patterson, *Computer Architecture: A Quantitative Approach* (5th Edition)
2. David Patterson and John Hennessy, *Computer Organization and Design: The Hardware/Software Interface* (5th Edition)
3. H. Stone, *Advanced Computer Architecture*, Addison Wesley
4. *Operating Systems: Three Easy Pieces*. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau. (online)
5. Architecture manuals, White papers, Research papers