

# CS 636: Analysis of Concurrent Programs

Swarnendu Biswas

Semester 2020-2021-II

CSE, IIT Kanpur

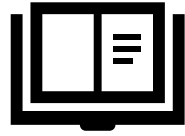
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<https://www.iitk.ac.in/doaa/data/FAQ-2020-21-I.pdf>

# Course Details



- CS636: Analysis of Concurrent Programs
- Semester 2020-2021-II
- Class hours: MW 5:105-6:25 PM (online, synchronous)
  - We will use Zoom
- **Webpage:** <https://www.cse.iitk.ac.in/users/swarnendu/courses/spring2021-cs636/>
- **LMS: REGISTER** for CS636 on Piazza and mooKIT

# Instructor Details



- Name: Swarnendu Biswas
- Office: KD 302
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- Email: [swarnendu@cse.iitk.ac.in](mailto:swarnendu@cse.iitk.ac.in)

# TA Details



Name	Email
Arun KP	kparun
Priyanka Talwar	talwarp
Randeep Kumar Sahu	randeeps
Sharwari Samdekar	sharwari
Vipin Patel	vipinpat

# Course Description



- We will discuss challenges and ideas related to concurrent programming
  - Shared-memory Programming, PThreads
  - Concurrency Bugs (data races, atomicity violations, deadlocks)
  - Synchronization Primitives (locks, monitors)
  - Transactional Memory (software and hardware)
  - Memory Consistency Models (languages and hardware models)
  - Concurrent Data Structures
  - Testing of Concurrent Programs
  - Performance Analysis

# Prerequisites

- Good background in OS and Computer Architecture will help
  - CS 330 (Operating Systems)
  - CS 335 (Compiler Design)
  - CS 422 and 622 (Computer Architecture)
- Programming maturity in C/C++, Java is desirable
  - Assignments and project **WILL INVOLVE** development with large projects
    - For example, Intel Pin, LLVM, Soot, Jikes RVM, RoadRunner, gem5

# Course Policies

- Online Classes
  - Be **ON TIME!**
  - Try to FOCUS and PARTICIPATE!
  - Avoid DISTRACTIONS!
  - Keep your mobile phones SILENT and AWAY from you
- Email subjects **SHOULD** start with [CS636]
- Submitting your assignments late will mean losing points automatically. You will lose 25% for each day that you miss, for up to two days



# Evaluation



Class participation/quizzes	10%
Assignments/paper critiques	30%
Term Project	35%
End-sem	25%

- This is a tentative allocation
- Might change allocations slightly depending on the class strength

# Academic Integrity

- You **MAY** discuss concepts with classmates
- All assignments **MUST** be your own or your team's work when teamwork is permitted
- You **MAY NOT** search online for existing solutions related to the assignments, even as a reference
- Students caught **CHEATING/PLAGIARIZING** will be punished

# Teaching Philosophy

- I am happy to clarify **REASONABLE** questions
- Slides will primarily be pointers to concepts and materials
  - I will post recommended reading material
- I encourage you to initiate and participate in discussions through Piazza and mooKIT

# Resources



- The Art of Multiprocessor Programming – Maurice Herlihy and Nir Shavit
  - There are two editions, either one would do
- A Primer on Memory Consistency and Cache Coherence – Daniel J. Sorin et al.
- Transactional Memory 2nd edition – Tim Harris et al.
- Shared Memory Synchronization – Michael Scott
- Java Concurrency In Practice – Brian Goetz et al.
- Parallel Computer Architecture: A Hardware/Software Approach – D. E. Culler et al.
  
- Other handouts and research papers

# What this course is not?

- This is not a programming tips and tricks course
  - We will discuss more generic abstract questions
- We will focus on a wide variety of topics
  - Focus will be on shared memory systems
- This is not an introductory course to any specific tool
  - However, we will probably make use of a few

# Extending Collaborative Learning



- Make use of Piazza and mookIT
- You are welcome to **PROVIDE** feedback anytime

Questions?

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