

# CS218

## Design and Analysis of Algorithms

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# Logistics

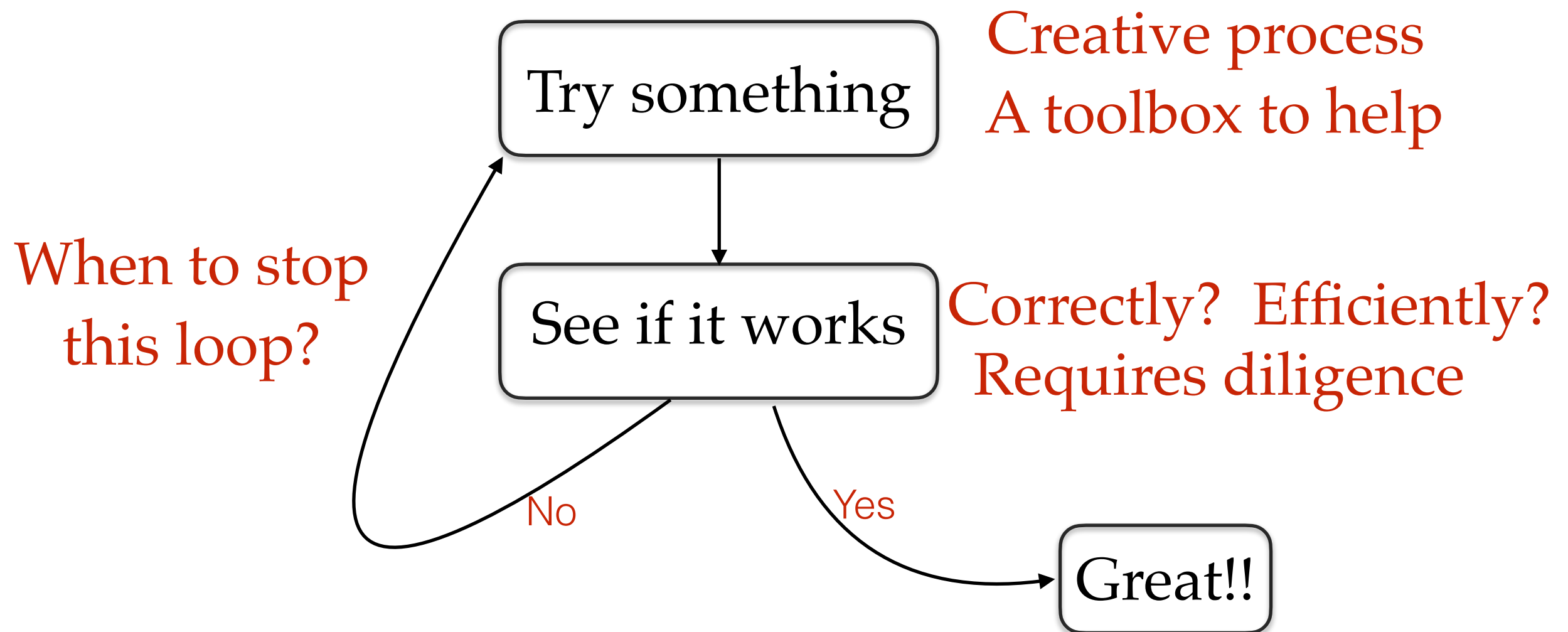
- **Class:** Mon 9:30, Tue 10:35, Thu 11:35. LH102.
- **Office hours:** Fri 4-5 pm. CC315
- Tutorials: will schedule
- Slides, exercises etc. on course webpage  
<https://www.cse.iitb.ac.in/~rgurjar/CS218-2025/>
- Announcements, doubts / discussions / exercises: Piazza.  
[http://piazza.com/iit\\_bombay/spring2025/cs218](http://piazza.com/iit_bombay/spring2025/cs218)  
Access code: cs218

# Grading

- 2 Programming assignments - 5+5 %
- 2 quizzes- 10+10% (Jan 29, Mar 26, 8:30-9:25 AM)
- Midsem - 25 %
- Endsem - 45 %

# Objectives

- How to design algorithms.



# Algorithm's correctness

- How to argue that an algorithm is **not** correct: show bad examples
- Arguing algorithm's correctness
  - **Correctness by confidence:** I came up with it, so it must be correct
  - **Correctness by examples:** because it works for my f examples
  - **Correctness by authority:** It's just obvious
- Formal proofs of correctness, whenever needed
- How to communicate / represent an algorithm

source: iemoji.com



# What will you learn

## ♦ **Principles of designing and analyzing algorithms:**

- Basic principles like induction/recursion.
- Divide and Conquer,
- Dynamic Programming,
- Greedy Algorithms.

## ♦ **Beyond the basics:**

- Bipartite Matching
- Network Flow and applications.
- Reductions.

## ♦ **Complexity:**

- Polynomial time and the Complexity classes NP, co-NP.
- NP-hardness.

## ♦ **Advanced topics:**

- Randomized algorithms
- Approximation algorithms

## ♦ **Miscellaneous:**

- How QR codes work?

# References

- Kleinberg, Tardos (great book, freely available)
- Prof. Sundar's course notes