

# Theory of Computation (Theory A)

Indian Institute of Technology, Bombay

**Algorithms, Graph Theory, Optimization, Randomness,  
Game Theory, Cryptography, Complexity Theory**

Lab: Any place with a white board+pen

July 21, 2019

# Theory Group



# Theory Courses

- Algorithms and Complexity
- Combinatorics
- Linear Optimization
- Applied Algorithms
- Approximation Algorithms
- Competitive Programming
  
- Pseudorandomness and Derandomization
- Network Security and Cryptography
- Advanced Tools from Modern cryptography
- Foundations of Parallel Computation
- Algebra and Computation
- Theoretical Machine Learning

# CS601: Algorithms and Complexity

Instructor: Rohit Gurjar

Basic + Advanced topics in Algorithms & Complexity (Not programming based)

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- **Main part**

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- ▶ Problems like Graph Matching and Network Flow and reductions.
- ▶ Complexity classes P, NP. NP-hardness.

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- ▶ Randomized algorithms: basic tools and applications.

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- **Expected to Know:** some basic data structures, graph theory, and run-time analysis.

# CS 604: Combinatorics

Instructor: Sundar Vishwanathan

## Mathematical problem solving:



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# Other theory courses

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## **CS767: Theoretical Machine Learning**



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# People

Listed in alphabetical order of their first names.

# People

Abhiram Ranade



Research Interests:

- Algorithm design and optimization, especially as applied to practical and theoretical problems in transportation.
- Introductory programming.

# People

Ajit Diwan



Research Interests: Graph theory and design and analysis of algorithms.

# People

Bharat Adsul



Research Interests: Algebra, Game theory, Computer aided geometric design.

# People

Manoj Prabhakaran



Research Interests:

## **Theoretical Cryptography**

Secure multi-party computation

Information-theoretic cryptography

Complexity-theoretic cryptography

## **Applied Cryptography**

Translating theory to practice



# People

Milind Sohoni



Research Interests: Game theory, Computer aided geometric design, Water resource management, Rural development.

# People

Mrinal Kumar



Research Interests: Complexity theory

- Arithmetic circuit complexity
- Algebra & Computation
- Error Correcting Codes.

# People

Nutan Limaye



Research Interests: Algorithms for graph problems, Space efficient algorithms, Complexity theory.

# People

Rohit Gurjar



Research Interests: Pseudorandomness, Algebraic algorithms for combinatorial optimization.

# People

Sundar Vishwanathan



Research Interests: Algorithms –online algorithms, Complexity theory.