## Approximation Algorithms

## K. Subramani, LCSEE, West Virginia University

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- 1. Mention probability, NP, coNP, RP, coRP and ZPP.
- 2. Linear and Integer programming forms, algorithms and complexity.
- 3. Basic facts from Probability Theory Tail bounds.
- 4. Approximation algorithms:
  - (i) **NP-hard** optimization problems.
  - (ii) Focus on minimization problems.
  - (iii) Will not focus on applications.
  - (iv) Definition of constant factor approximation algorithms.
  - (v) Definition of PTAS, FPTAS and FPRAS.
  - (vi) How can we guarantee approximations in polynomial time, when we cannot find the optimal in polynomial time?
- 5. Approach of this course:
  - (a) Propose a problem.
  - (b) Motivation.
  - (c) NP-hardness.
  - (d) Propose heuristics.
  - (e) Discard heuristics or prove bounds.
  - (f) New heuristics or new bounds.
- 6. Define the Vertex Cover problem.