**Advanced Approximation Algorithms** **CMU 15-854B, Spring 2008**

Course Information

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**Course goals:**
1. Cover what you need to know to be at the forefront of approximation algorithms research.
2. Explore recent connections between algorithms, integrality gaps, and hardness results.

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**Meetings:** Tuesday & Thursday, 1:30 – 2:50, Wean 5409

**Instructors:** Anupam Gupta (`anupamg@cs`)
Ryan O'Donnell (`odonnell@cs`)

**Web page:** `http://www.cs.cmu.edu/~anupamg/adv-approx`
**Blog:** `http://approximability.blogspot.com`

**Office hours:** By appointment.

**Prerequisites:** Two graduate-level courses: one in algorithms, one in complexity.

**Textbook:** None required.
For algorithms, try the book *Approximation Algorithms*, by Vijay Vazirani.
For hardness, try `http://www.cs.berkeley.edu/~luca/pubs/inapprox.pdf`

**Course requirements:**

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|---|---|---|
| 6 homeworks | = 66% | (about 2 weeks each) |
| 3 scribe notes | = 24% | (due **3 days** after class) |
| Class/blog participation | = 10% | |

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**Tentative list of topics:**
Approximation algorithm definitions
Greedy algorithms
Linear programming
Semidefinite programming
Integrality gaps
Randomized rounding
Primal-dual methods
Metric methods
Label-Cover-based hardness reductions
Fourier analysis
Long Code-based reductions
Friedgut/KKL/Majority Is Stablest theorems
Dinur-Safra-style Vertex-Cover hardness
Unique Games Conjecture