Announcements

- Assignment 3 due Friday @ 5pm.
- No late days on Extreme Optimization, which is the team assignment for this coming week.
- There will be no sections next week. Instead, we will hold extra office hours during regular section times.
Extreme Optimization
Curing Cancer with Radiotherapy

AM121/ES121

School of Engineering and Applied Sciences
Harvard University

Fall 2015
Saving Lives: Radiotherapy

- Radiation kills normal and cancer cells.
- But repair mechanisms for cancer cells are less efficient.
- Radiotherapy as cancer treatment
  - Advances in imaging (CT, MRI)
  - Advances in radiation delivery (Intensity modulated radiotherapy)
Radiation Delivery
### Conventional Radiotherapy

- 4 to 7 beams.
- Oncologist and physicist work together to determine beam angles and intensities by manual trial and error.
- Goal is hard to satisfy with so few beams.

Goal: Maximize delivery to tumor area and minimize delivery to critical area.
The issue at hand

- Technologies allow for accurate delivery using many more beams.
- Missing piece: optimization to determine the intensity of a set of beams to best deliver radiation.
- Oncologist provided us with beam data and example images of critical and tumor areas.
- We will convert the data and give it to you.
Logistics

- **Posted:** Today at 5pm. *We have formed teams of 4. Announced after class today.*

- **Contribute:** all team members equally!

- **Due:** next Friday 10/9 at 5pm. **No late days.** Submit your write-up (use \LaTeX) with solution visualizations and all AMPL files to Canvas dropbox.

- **ALSO:** submit by Monday 10/12 at 11:59pm, presentation slides (in presentations folder in Canvas dropbox).

- **Present:** Wednesday 10/14 during lecture, the oncologist will send cake! (from Flour Bakery!!) **Everyone must attend.**

- Come to our TF office hours!
Project performance evaluation

- **Creativity**
  - coming up with interesting ideas and models that are justifiable but not the most obvious

- **Correctness**
  - are your linear programming models fully and precisely specified?
  - will they achieve the optimal solution your team has decided to look for (if it exists)?

- **Clarity**
  - clear explanation of your ideas
  - justification for your decisions
  - description of objective functions and constraints
  - discussion of the solutions you obtain, with reference to the models you use (e.g. compare the visualizations)