February 3 Reg Day	**4 - Class 1**	5	**6 - Class 2**	7
10	**11 - Class 3**	12	**13 - Class 4**	14
17 No Class	18 “Monday”	19	**20 - Class 5**	21
24	**25 - Class 6**	26	**27 - Class 7**	28
March 3	**4 - Class 8**	5	**6 - Class 9**	7 Add Date
10	**11 - Class 10**	12	**13 - Class 11**	14
17	**18 - Class 12**	19	**20 - Class 13**	21
24 Spring Break	25 Spring Break	26 Spring Break	27 Spring Break	28 Spring Break
31	April **1 - Class 14**	2	**3 - Class 15**	4
7	**8 - Class 16**	9	**10 - Class 17**	11
14	**15 - Class 18**	16	**17 - Class 19**	18
21 No Class	22 No Class	23	**24 - Class 20** Drop Date	25
28	**29 - Class 21**	30	May **1 - Class 22**	2
5	**6 - Class 23**	7	**8 - Class 24**	9 Last Due Date
12	**13 - Class 25**	14	**15 - Class 26** End of Classes	16

```
    --- Fixed-size sets ---

1   Administration
    Probability:
      Base machinery (modeling, outcomes, sample space, Pr, events)
    * Monty Hall
    * Intransitive Dice

2   Logic
    Numeracy
    * Ambiguous sentence: "If any studence can ace this class, then
        either the exams or the homeworks are too easy."
    * Numeracy examples from Paulos or news
    * Three friendds or strangers among six people (1)

3   Probability:
      Bias, conditioning, independence
    * Pennies on edge trick
    * Which hand has the higher number?
    * Flipping frisbees (2)

    --- Finite sets ---

4   Induction:
      Ordinary
    Summations:
      sum i and sum i^2
    * Covering a square with L-shaped tiles
    * Red/black pairs card trick

5   Induction:
      Strong induction, well-ordering
      State machines
    * Die Hard 2

6   Sums:
      Geometric, finite and infinite
      Harmonic
    * Book stacking
    * Desert storm
    * Lottery payout options
```

```
7   Counting:
      Products
      Inclusion/exclusion
    * Derangement demo (?)

8   Proof by counting
      Functions
      Pigeonhole principle
    * Hairs on heads
    * Same sum (3)
    * Red-black "stop" card game

9   Probability:
      Random variables
      Expectation
    * Chuck-a-Luck
    * Coupon collector demo (?)

10  Counting:
      Permutations and Combinations
      Stars and bars
    * Birthday paradox
    * Love machine
    * Mind reading trick

11  Game theory
      Extensive and normal form
      Zero-sum games
      Minimax theorem
    * Rock-scissor-paper against computer
    * Other games...

12  Graph theory:
      Definitions
      Trees
    * Eulerian graph problems

13  Graph theory:
      Planar graphs
      Graph coloring
      Euler's formula?
      Platonic solids?
```

Max-flow, min-cut theorem?

14 Approximation:
Asymptotics
Integration
Stirling's formula
Taylor series

15 Recurrences:
Linear
Divide and conquer (Defer to 6.046?)
* Towers of Hanoi
* Paper cutting

16 Number theory:
Fundamentals
* Extracting 5th roots

17 Number theory:
Turing's code (4)

19 Tail inequalities:
Markov
Chebychev and variance
* Jellybean guessing

20 Binomial tails
* Election analysis

21 Tail inequalities:
Chernoff
* Random vs. nonrandom sequences
* Counting down card trick

--- Uncountable sample spaces ---

22 Finite, countable, and uncountable sets

23 Uncountable sample spaces
* HTH vs. HHH
* Triangular duel
* Assembling a system [If we can prove Wald's Thm for uncountable spaces.]

24 Random walks
    * Gambler's ruin

(1) There is a trivial aspect of pigeonholing here: among five people, you have either three friends or three nonfriends. I don't think that should delay this example, which is a strong demonstration of case analysis.

(2) Ultimate Frisbee players decide first possession by flipping two frisbees. Someone calls either ‘‘same side up’’ or ‘‘different sides up’’. What is the best strategy? Weaves bias and independence considerations.

(3) Ask each student to write down a "random" 27-digit number. Assert that there are two disjoint sets of students whose numbers have EXACTLY the same sum. (With 100 students, there are 2^100 = 10^30 subsets of students, each holding numbers summing to at most 100 * 10^27 = 10^29, thus two subsets must have the same sum. Throw out common elements to make them disjoint.) To illustrate the power of pigeonholing, we could collect and post the numbers on the web and challenge anyone to actually FIND those two sets with the same sum by the end of the term!

(4) This is a lecture from the Dartmouth course last summer that weaves the story of Turing's life with some basic number theory. There are no demos, but I think it might be entertaining anyway.

(?) I don't know what the actual demonstration of this principle is.