

PROBABILITY, POKER AND DECISIONS  
Drexel University Honors Colloquium, Winter 2010  
Course Description  
(this is *not* a syllabus)

The course has two objectives. First, to make the students aware of the principles of good decision-making under uncertainty and of unconscious biases that adversely affect decision-making. Second, to introduce the student to game theory and its role in adversarial decision-making. Hold'em poker will be used to illustrate the concepts. The level of mathematics involved is high school algebra. As opposed to other games, poker is used here because of its natural appeal to the analytic mind: proper action depends on probability, expected value is an important criterion, bankroll management is critical, and it is strategic. Of all the poker games, hold'em is used because its structure (more so than draw or stud) makes it much more strategic.

During the first half of the course, the students are introduced to the rules of hold'em and the elements of probability. The students will be shown how probability calculations can enhance decision making in poker. However, when the number of players is small, e.g., two or three, probability becomes less important and "game theory" become more important. During the second half of the course, game theory is introduced and a game theoretic approach to hold'em poker is developed.

We start with limit hold'em, because the math is easier, and then move on to no limit hold'em. There will be assigned readings on decision theory and on game theory. Students will be required to get an online poker account and to play poker online.

## FIRST HALF OF THE COURSE:

- rules of hold'em
- probability and probability calculations for hold'em, including counting rules and Bayes' Theorem
- pot odds, implied odds, hit-to-win, bluffing and semi-bluffing
- expected value and opening hands, counting outs
- decision making under uncertainty, expected utility
- decision making paradoxes: St. Petersburg, Allais, and Ellsburg paradoxes
- prospect theory

## SECOND HALF OF THE COURSE:

- introduction to game theory
- heads-up play
- game theoretic models of poker
- jam or fold decisions