AMS 80A: Gambling and Gaming (Spring 2015)
Extended Syllabus

March 30, 2015

Week 1:
Monday 3/30 – Course description; A brief course overview.
Wednesday 4/1 – Screening of History Channel’s documentary “High Rollers: A History of Gambling”.
Friday 4/3 – Motivate the idea of probability (introduce the paradox of Chevalier De Mere); Introduction to probability. Experiment, sample space, events; examples.

Week 2:
Monday 4/6 – Axiomatic definition of probability as a measure of uncertainty; probability axioms.
Wednesday 4/8 – Finite sample spaces; multiplication principle of counting; examples.
Friday 4/10 – examples.
   Homework assignment 1

Week 3:
Monday 4/13 – Compound events (unions and intersections), complement of an event, disjoint event, examples.
Tuesday 4/15 – Basic properties of probability; addition rule of probability; examples.
Thursday 4/17 – Conditional probabilities: motivation, definition, and examples.
   Homework assignment 2

Week 4:
Monday 4/20 – Conditional probabilities: multiplication rule for probabilities of intersections, with examples; independence for two events.
Wednesday 4/22 – Independence: definitions and examples; multiplication rule for independent events; example.
Friday 4/24 – Examples.

**Week 5:**
Monday 4/27 – Independence and sampling with or without replacement; analysis of the “pass line” bet in the game of craps.
Wednesday 4/29 – Brief review of key topics for the exam.
Friday 5/1 – EXAM 1.

**Week 6:**
Monday 5/4 – Screening of movie “Dice dominator” from the Breaking Vegas series of The History Channel; further details and analysis for the game of craps
Wednesday 5/6 – Motivating example for Bayes theorem; Law of total probability; Bayes theorem
Friday 5/8 – The game of urns; the Monty Hall problem.

*Homework assignment 3*

**Week 7:**
Monday 5/11 – Further analysis of the Monty Hall problem using Bayes theorem; motivating discussion of random variables and expectation through the “straight-up” bet in roulette.
Wednesday 5/13 – Random variables, probability distributions, expectation and variance: definitions, methods, and examples.
Friday 5/15 – Examples.

*Homework assignment 4*

**Week 8:**
Monday 5/18 – Properties of expectation; comparison of the expectation and standard deviation of the profit from different bets in roulette; basic principles of a “rational player”.
Wednesday 5/20 – Screening of movie “Beat the wheel” from the Breaking Vegas series of The History Channel; more examples from roulette; discussion of problems from homework 4.
Friday 5/22 – Review.

**Week 9:**
Wednesday 5/27 – EXAM 2 Friday 5/29 – Screening of movie “The roulette assault” from the Breaking Vegas series of The History Channel; expected total profit from multiple roulette plays.
Homework assignment 5

Week 10:
Monday 6/1 – Expectation, variance, and standard error for sums of independent and identically distributed random variables; examples.
Wednesday 6/3 – using the Central Limit Theorem to study the distribution of the total profit from multiple roulette plays.
Friday 6/5 – Continued from last class; Review.