# CSI 30 LECTURE NOTES (Ojakian)

## Topic 14: Probability

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**OUTLINE**
(References: 7.1)

1. Probability

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1. Opening Question
   Monty Hall Problem.
2. Basic Terminology
   (a) Example: Roll die, and different possibilities.
   (b) Sample space. Along with assumption: equally likely outcomes.
   (c) $P(E) = \dfrac{\text{Event Size}}{\text{Sample Space Size}}$
   (d) See above examples with this formula
   (e) Note: $0 \leq P(E) \leq 1$
3. More Examples
   (a) Urns with different balls. Taking one ball.
   (b) Two dice questions (sum being a value)
4. Complements
   (a) Example: NOT rolling something?
   (b) $P(\overline{E}) = 1 - P(E)$
5. Inclusion-Exclusion (for probability)
   (a) Simple Example:
      i. 7 students from The Bronx (3 of which are math majors), 3 from Manhattan (1 is a math major). Question: Prob(From the Bronx or a math major).
      ii. Note: If you just add, you get a probability above 1!
   (b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   (c) Example 9.
6. Exercises
   (a) Section 7.1: 1 - 6, 22, 23