- LO 1. Define trial, outcome, and sample space.
- LO 2. Explain why the long-run relative frequency of repeated independent events settle down to the true probability as the number of trials increases, i.e. why the law of large numbers holds.
- LO 3. Distinguish disjoint (also called mutually exclusive) and independent events.
 - If A and B are independent, then having information on A does not tell us anything about B.
 - If A and B are disjoint, then knowing that A occurs tells us that B cannot occur.
 - Disjoint (mutually exclusive) events are always dependent since if one event occurs we know the other one cannot.
- LO 4. Draw Venn diagrams representing events and their probabilities.
- LO 5. Define a probability distribution as a list of the possible outcomes with corresponding probabilities that satisfies three rules:
 - The outcomes listed must be disjoint.
 - Each probability must be between 0 and 1.
 - The probabilities must total 1.
- LO 6. Define complementary outcomes as mutually exclusive outcomes of the same random process whose probabilities add up to 1.
 - If A and B are complementary, P(A) + P(B) = 1
- LO 7. Distinguish between union of events (A or B) and intersection of events (A and B).
 - Calculate the probability of union of events using the (general) addition rule.
 - + If A and B are not mutually exclusive, P(A or B) = P(A) + P(B)? P(A and B)
 - + If A and B are mutually exclusive, P (A or B) = P (A) + P (B), since for mutually exclusive events P(A and B) = 0
 - Calculate the probability of intersection of independent events using the multiplication rule.
 - + If A and B are independent, P(A and B) = P(A)? P(B)
 - + If A and B are dependent, P(A and B) = P(A B)? P(B)
 - * Reading: Section 2.1 of OpenIntro Statistics
 - * Videos:
 - Basics of probability, YouTube (1:42)
 - Union of events and the addition rule, YouTube (3:37)
 - Independent events, intersection of events, multiplication rule, and Bayes' Theorem, YouTube (3:25)
 - * Test yourself:
 - 1. What is the probability of getting a head on the 6th coin flip if in the first 5 flips the coin landed on a head each time?
 - 2. True / False: Being right handed and having blue eyes are mutually exclusive events.
 - 3. P(A) = 0.5, P(B) = 0.6, there are no other possible outcomes in the sample space. What is P(A and B)?

- LO 8. Distinguish marginal and conditional probabilities.
- LO 9. Construct tree diagrams to calculate conditional probabilities and probabilities of intersection of non-independent events using Bayes' theorem.
 - * Reading: Section 2.2 of OpenIntro Statistics
 - * Videos:
 - Probability trees, Dr. Çetinkaya-Rundel (8:23)
 - Conditional probability, YouTube (8:59 watch from 3:33 onwards)
 - Bayes' Theorem worked out example, YouTube, (9:20, somewhat lengthy)
 - Another example of conditional probabilities using Bayes' Theorem, YouTube (7:20)
 - * Test yourself: 50% of students in a class are social science majors and the rest are not. 70% of the social science students and 40% of the non-social science students are in a relationship. Create a contingency table and a tree diagram summarizing these probabilities. Calculate the percentage of students in this class who are in a relationship.