I. **Pre-class material** Either read the indicated textbook sections OR watch the indicated video.

(a) **Sections to Read** (All content from Blitzstein and Hwang's *Introduction to Probability* unless otherwise noted). A digital copy of the textbook is available for free via the authors' website.

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(b) **Videos to Watch** (All videos from Blitzstein's Math 110 YouTube channel, unless otherwise noted)

- Lecture 29: Law of Large Numbers and Central Limit Theorem (from 15:00 to end).

II. **Objectives** (By the end of the day's class, students should be able to do the following:)

- State the Central Limit Theorem.
- Use the Central Limit Theorem to estimate relevant probabilities.
- Use continuity correction and the Central Limit Theorem to obtain accurate approximations of Binomial probabilities.

III. **Reflection Questions** (Submit answers on Gradescope `https://www.gradescope.com/courses/425901`)

1) Let $U_1, U_2, \ldots, U_{20}$ be iid Unif$(0, 6)$. Recall that $E[U_i] = 3$ and $\text{Var}(U_i) = \frac{6^2}{12} = 3$. Let $S = U_1 + \cdots + U_{100}$. Use the Central Limit Theorem to show that

$$P\left(60 - 2\sqrt{60} < S < 60 + 2\sqrt{60}\right) \approx 0.95$$

2) In your own words, describe one way the Normal distribution is related to the Binomial distribution.

3) Are there any iid random variables $X_1, X_2, \ldots, X_n$ so that $\bar{X}_n$ is **exactly** (rather than approximately) Normally distributed?

IV. **Additional Feedback** Are there any topics you would like further clarification about? Do you have any additional questions based on the readings / videos? *If not, you may leave this section blank.*