BST 230: Statistical Thinking in Public Health

Aligning Structure and Learning: A Module-Based Redesign of an Online Undergraduate Statistics Course

Course Snapshot

BST 230 serves as a requirement for Bachelor's of Public Health majors and fulfills a University of Kentucky Core curriculum requirement. Enrolling approximately 700 students each year, it reaches a large and diverse student audience. The course is designed to promote statistical literacy with an emphasis on public health contexts.

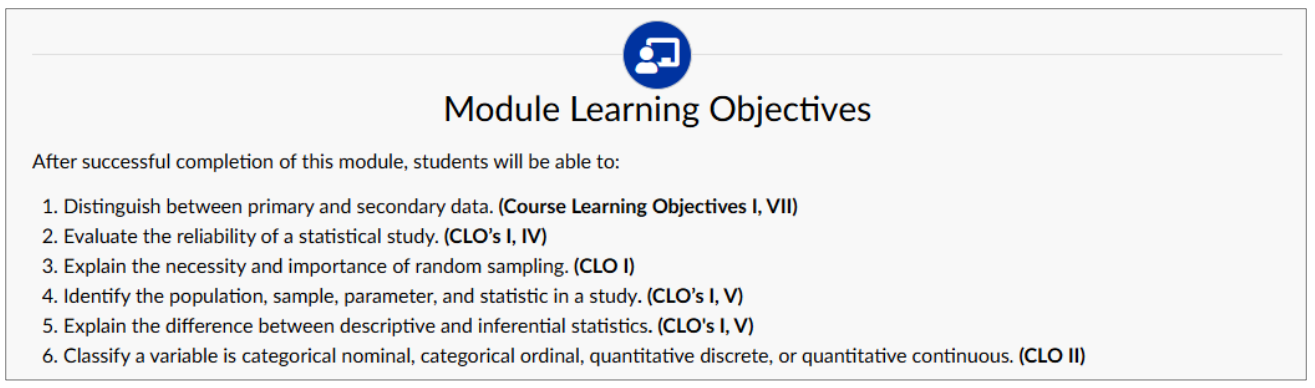
Many (not all!) students enter the course with limited interest in statistics and some degree of anxiety. In the online environment, this can lead to reduced engagement and a focus on completing assignments rather than mastering concepts. While online students have historically performed similarly to their face-to-face peers on homework assignments, lower scores on proctored exams suggest challenges with long-term retention and application of course material.

Design Goals

1. Address course learning outcomes completely and in an intuitive order.
2. Create more engaging, interactive activities.
3. Improve the navigation of the course so that students spend their time in the course learning rather than trying to figure out what to do next.

Alignment of Module and Course Learning Outcomes

By mapping module-level and assessment-level learning outcomes to the course learning outcomes (CLOs), I identified opportunities to improve alignment and increase the cognitive rigor of selected assessments. Several assessments were revised to evaluate higher-order learning objectives, such as explanation and application rather than simple recall. I also made learning objectives explicit within each module and assessment to help students understand the purpose of course activities and their connection to broader course goals.

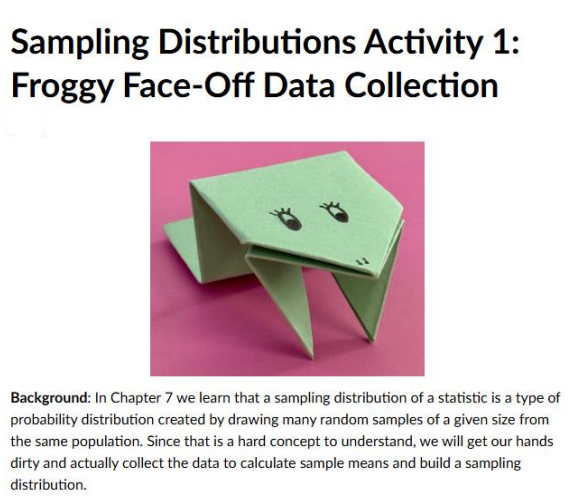


Module Learning Objectives

After successful completion of this module, students will be able to:

1. Distinguish between primary and secondary data. **(Course Learning Objectives I, VII)**
2. Evaluate the reliability of a statistical study. **(CLO's I, IV)**
3. Explain the necessity and importance of random sampling. **(CLO I)**
4. Identify the population, sample, parameter, and statistic in a study. **(CLO's I, V)**
5. Explain the difference between descriptive and inferential statistics. **(CLO's I, V)**
6. Classify a variable is categorical nominal, categorical ordinal, quantitative discrete, or quantitative continuous. **(CLO II)**

Engaging Activity: Froggy Face-Off



Sampling Distributions Activity 1: Froggy Face-Off Data Collection

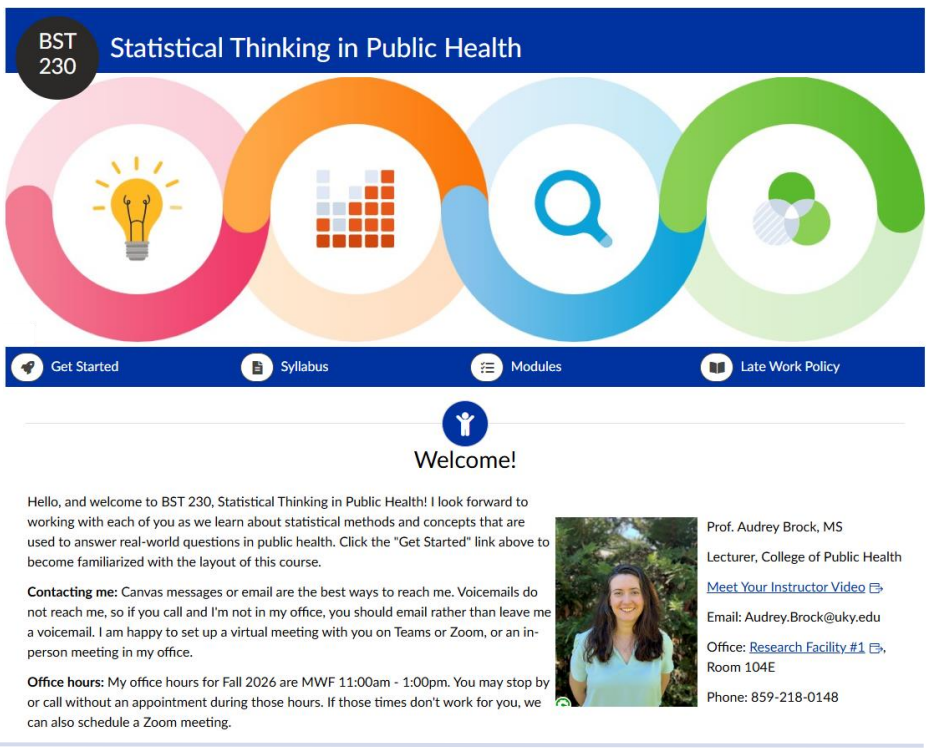
Background: In Chapter 7 we learn that a sampling distribution of a statistic is a type of probability distribution created by drawing many random samples of a given size from the same population. Since that is a hard concept to understand, we will get our hands dirty and actually collect the data to calculate sample means and build a sampling distribution.

Sampling distributions are among the most conceptually challenging topics covered in the course. To strengthen student understanding, I adapted a hands-on activity previously used in face-to-face instruction for the online environment. Students construct origami frogs and collect data by measuring the distances their frogs jump, which are then combined to create a class sampling distribution of the mean jump length.

Using these student-generated data, learners complete a multi-part assignment involving confidence intervals and hypothesis testing to compare their frog's performance with that of their classmates. By actively participating in the data collection process and developing a personal connection to the project, students are more engaged with the material and gain a deeper understanding of abstract statistical concepts.

3 *UK Online Canvas Template*

UK Online's Canvas template provided a strong foundation for course redesign, offering a visually engaging homepage, consistent module and assessment structures, and built-in placeholders for key course components. The template supported the implementation of online course design best practices while promoting organization, consistency, and ease of navigation for students.



Reflection

As a result of participating in the Faculty Fellow Course Quality Design Program, I have become more intentional in my approach to online course design. I am more deliberate in aligning module and assignment level learning outcomes with broader course learning outcomes, as well as in selecting instructional activities whose formats effectively support their intended learning goals.

The process of systematically evaluating course materials, learning activities, Canvas organization, and even the syllabus enabled me to view the course from the student perspective. This experience highlighted the importance of considering how students navigate and engage with course content in an online environment, a perspective I intend to maintain as I continue refining and enhancing the course.

Recognizing that meaningful course improvement is an incremental process, I plan to gradually replace static learning activities, such as worksheets, with more varied and interactive instructional approaches that promote deeper learning and increase student engagement. I would like to thank the Instructional Designers at UK Online, particularly Shatha Hadad, for offering expertise in identifying appropriate technologies and collaborating on the development of innovative instructional activities. I am eager to continue improving this course!

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