

Integrated Statistics and Quantitative Reasoning (ISQR) Course Profile

Learn more about ISQR and how this course can be a gamechanger for your students.

ISQR was developed by the Charles A. Dana Center at the University of Texas at Austin in collaboration with WestEd and teachers, staff, students, and families from districts across the country.

CONNECT WITH ISQR

[Sign up](#) to receive updates about future ISQR development and resources.

Visit utdanacenter.org/integrated-statistics-and-quantitative-reasoning to find out more information about the course.

States, districts, and schools interested in offering ISQR can fill out this [form](#).



What Is ISQR?

Integrated Statistics and Quantitative Reasoning (ISQR) invites students to use math to understand and take on real, complex problems. Organized around driving questions like “Is it fair” and “Is it significant,” students build the skills to analyze, interpret, and present data while examining its role in society. The course centers the why behind statistical and quantitative literacy, helping students make informed decisions, challenge inequities, and engage thoughtfully with the data-driven world around them.

ISQR opens with work that builds a collaborative, curious classroom, introduces the data cycle, and grounds students in data ethics and the responsible use of AI. From there, students apply statistical reasoning and quantitative tools to real contexts that matter to them. The course ends with a capstone project where students explore a question of their own by reasoning critically, ethically, and creatively with data.

Availability and Supplemental Tools

ISQR is being piloted in eleven states during the 2026-27 school year and will be freely available as an OER beginning in the fall of 2027.

The course materials will be supplemented with an *ISQR Implementation Toolkit* that provides tools for district and school leaders to prepare to offer ISQR, communicate with students and families, and support teachers. A small set of asynchronous resources will be provided to help prepare teachers to teach the course. We anticipate announcing additional fee-for-service professional learning resources in early 2027.

What Makes ISQR Different?

Most fourth-year math options ask students to repeat an algebraic course, move into Precalculus, or take a standalone statistics course bolted onto the sequence. ISQR takes a different approach.

Built around questions, not topics

ISQR organizes mathematics around driving questions, so students see why a tool matters before they learn how to use it. Traditional courses often reverse that order: a formula first, an application after.

One course, not three

Algebra, statistics, and data literacy usually live in separate courses, or get squeezed into a two-week unit at the end of the year. ISQR integrates all three so students build one connected set of quantitative habits instead of three disconnected ones.

Data ethics and AI literacy from day one

Before students calculate a single measure of center, Unit 1: Setting a Foundation has them examine data privacy, informed consent, and bias, including the energy cost of an average AI query. Ethics isn't a unit tacked on at the end. It's the lens students use for the whole course.

Contexts students actually recognize

Students work with the data behind cryptocurrency volatility, self-driving car safety records, social media algorithms, fast food pricing, and Pokémon card values. These aren't textbook stand-ins. They're situations students already have opinions about.

Every unit builds toward the Capstone

Each Big Questions unit reinforces outcomes from the ones before it, so skills compound instead of resetting. That structure culminates in a Capstone where students run a full data cycle on a question they chose themselves, from formulating it to presenting what they found.

What does higher education think about ISQR?

WestEd and the Dana Center are actively working to build awareness of ISQR with higher education audiences. Here are a few responses from higher education representatives who have reviewed sample course materials.

“There is a real disconnect between the modern quantitative skills our students need and the math curriculum they encounter in high school. The ISQR course equips students with skills and ways of thinking that are genuinely useful for navigating a world awash in quantitative information. All students graduating high school should encounter the ideas of this course—they're that important.”

— Luke Tunstall, President, National Numeracy Network, Assistant Professor of Mathematics and Director of the Quantitative Reasoning and Skills Center, Trinity University

“As a college faculty member, I hope incoming students are able to reason with data, explain their thinking, work with others, and think critically; the ISQR course builds those skills deliberately. By moving away from memorized formulas and toward real-world, project-based work, it prepares students for the kind of mathematical thinking college demands, especially in an age of AI. I believe the ISQR can prepare students more accurately for college than a standard high school sequence.”

— Taylor Darwin, Assistant Professor of Mathematics, Tarleton State University

Mathematics is more than learning drills and procedures. Students are more likely to succeed when they can use mathematical reasoning and technology to investigate real-world applications. That is the purpose of ISQR. As AI and data science continue to grow, ISQR helps prepare students for college-level mathematics and careers that require quantitative and technological skills.

— Michael Dorff, President of the Mathematical Association of America, 2019-2021, Chair, Department of Mathematics, Brigham Young University

Course Structure at a Glance

ISQR moves through an introductory unit, six Big Questions, and a culminating Capstone project. Each unit pairs a set of key skills with real contexts and includes both learning outcomes students focus on and ones they reinforce from earlier units. That structure means students keep using what they learned all the way through the Capstone, instead of leaving it behind once the unit is over.

Unit	Days (45-min)	What Students Do
Setting a Foundation	12	Students build a community of practice, learn the statistical data cycle, and use technology to summarize and visualize data.
Is It Typical?	24	Students summarize and compare distributions, reason with rates and percents, and calculate conditional probabilities using two-way tables.
Is It Fair?	14	Students compare measures of center and variability across groups, fit linear regression models, and reason about absolute and relative change.
Is It Significant?	14	Students distinguish statistical from practical significance and use simulation-based hypothesis testing to evaluate claims.
Is It Worth the Risk?	24	Students interpret probability, risk, and odds, and use those tools to reason through high-stakes, real-world decisions.
How Do They Know?	17	Students explain how prediction systems work and compare deterministic models with models that account for chance.
What Is the Cost?	17–19	Students fit and interpret regression models, reason about financial trade-offs, and evaluate model accuracy using RMSE.
Capstone	15	Students run the full data cycle on a self-selected question, from formulating it to analyzing data and communicating findings.

Four Outcomes Anchor Every Unit

1. Develop mathematical habits of mind, such as engaging in sense-making; communicating effectively verbally, in writing, and using graphical displays; justifying conclusions; and critiquing their own work and the work of their peers.
2. Approach solutions to authentic tasks from multiple perspectives (e.g., conceptual, numerical, algebraic, statistical, graphical, geometric) to refine thinking and produce a more robust solution.
3. Select and use available technology as appropriate for the situation.

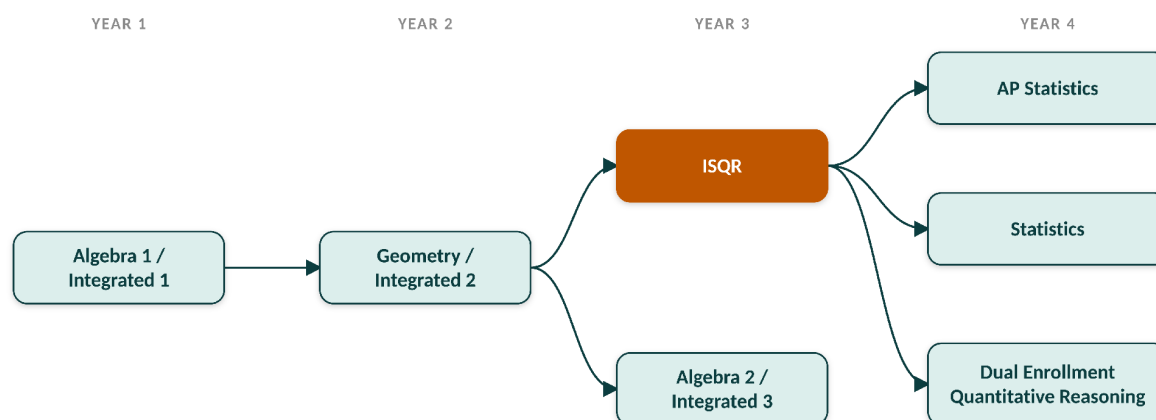
4. Employ systematic problem-solving processes, including the statistical problem-solving process (formulating questions that can be answered by data, collecting or considering data, analyzing data, and interpreting results).

Where ISQR Fits in Math Pathways

States are not treating ISQR as an add-on. Districts are actively rethinking what the third or fourth year of high school math could look like for students on various pathways, and ISQR is entering that conversation as a rigorous, transferable option, not a remedial one.

Third-Year Placement

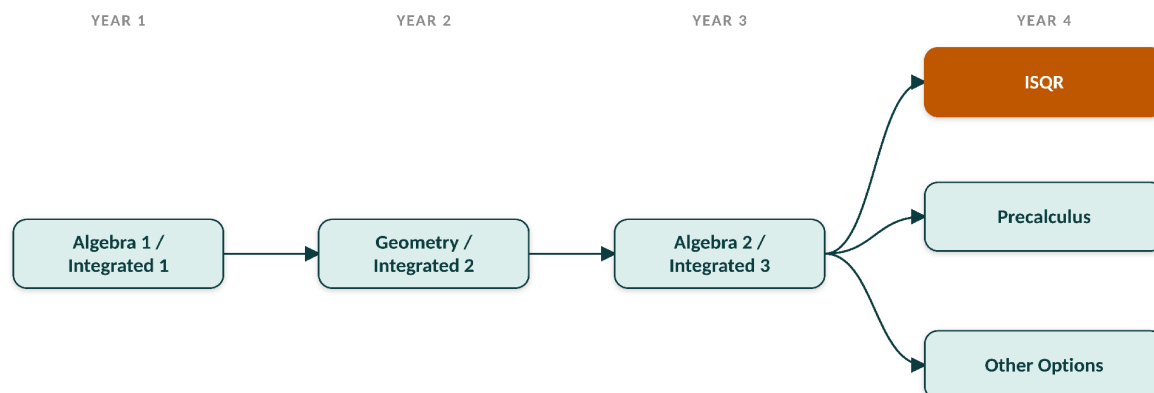
Here, ISQR sits alongside Algebra 2/Integrated 3 as a third-year mathematics course. Students who take ISQR in year three can move into courses such as AP Statistics, Statistics, or a dual enrollment quantitative reasoning course in year four.



ISQR as a third-year mathematics course, opening into three strongly connected fourth-year options.

Fourth-Year Placement

Here, students follow the traditional Algebra 1, Geometry, Algebra 2 sequence through year three, then choose ISQR as one of several fourth-year options, alongside Precalculus and other electives.



ISQR as a fourth-year course, alongside Precalculus and other options.

Keep Exploring

The sample student pages and instructor notes on the following pages illustrate the design and features of the ISQR curriculum. You'll see the types of questions and data sets that students explore critically, plus the scaffolding educators use to guide successful classroom experiences.

Visit utdanacenter.org/integrated-statistics-and-quantitative-reasoning to find out more information about the course.



Interested in offering ISQR in Fall 2027?

WestEd is collecting information from districts, states, and school leaders interested in adding ISQR to their high school course catalogs. Share your interest [here](#).

Filling out this form doesn't commit you to anything — it puts you on the list for updates and outreach from the team.

Sample Materials

Excerpts from student pages and instructor notes are shown below. These sample materials, from the *Big Question: Is It Significant?*, take students through an engagement and exploration around a question they may have actually wondered about—do earplugs work? By centering a topic with relevance to students, incorporating real data and use cases, students can then apply statistical reasoning and quantitative tools contextually.

Big Questions: Is It Significant?

Student Pages

SECTION 3: DO EARPLUGS WORK?

ENGAGE

1. Have you ever been to a rock concert? Was it loud? What are some other activities that are loud?
2. Why might loud activities pose a risk to your hearing?

Sound levels are measured in decibels (dB). The decibel scale is not linear. For example, a noise measured at 20 dB is 10 times louder than a noise at 10 dB. Typical noise measurements for some common activities are shown in the tables below.

Decibels	Example
0	Silence
10	Breathing, ticking watch
20	Rustling leaves, mosquitos
30	Whispering
40	Light rain, computer hum
50	Quiet office, refrigerator
60	Normal conversation, air conditioner
70	Shower, toilet flush, dishwasher
80	City traffic, vacuum cleaner
90	Music in headphones, lawnmower

Decibels	Example
100	Motorcycle, hand drill
110	Rock concert, chain saw
120	Thunder
130	Maximum stadium crowd noise
140	Airplane taking off
150	Fighter jet taking off
160	Shotgun
170	Fireworks
180	Rocket launch

3. Are you surprised at any of the examples in the tables?

EXPLORE

Extended exposure to loud noise can cause permanent hearing loss, and rock concerts are loud! According to DecibelPro:¹

- Over 2 hours of exposure to noise levels above 90 dB can lead to hearing loss.

¹ Polyanskiy, V. (2026). Rock concert decibels estimated: How loud is a rock concert. *Decibel Pro: dB Sound Level Meter Blog*. <https://decibelpro.app/blog/how-loud-is-a-rock-concert/#:~:text=An%20answer%20to%20How%20many,levels%20than%20an%20indoor%20concert>

- A 14-minute exposure to noise levels above 100 dB or a 2-minute exposure to noise levels above 110 dB can also cause hearing loss.

In a study of noise levels at a rock concert, researchers collected data on noise levels at a rock concert in a large arena.² They recorded noise levels at 3 different locations in the arena during a 2½ hour concert and produced the graph below. In the graph, groups A, B, and C represent the three different locations. The y-axis is labeled LEQ, which represents the average noise level, measured in decibels, for each 10-minute interval.

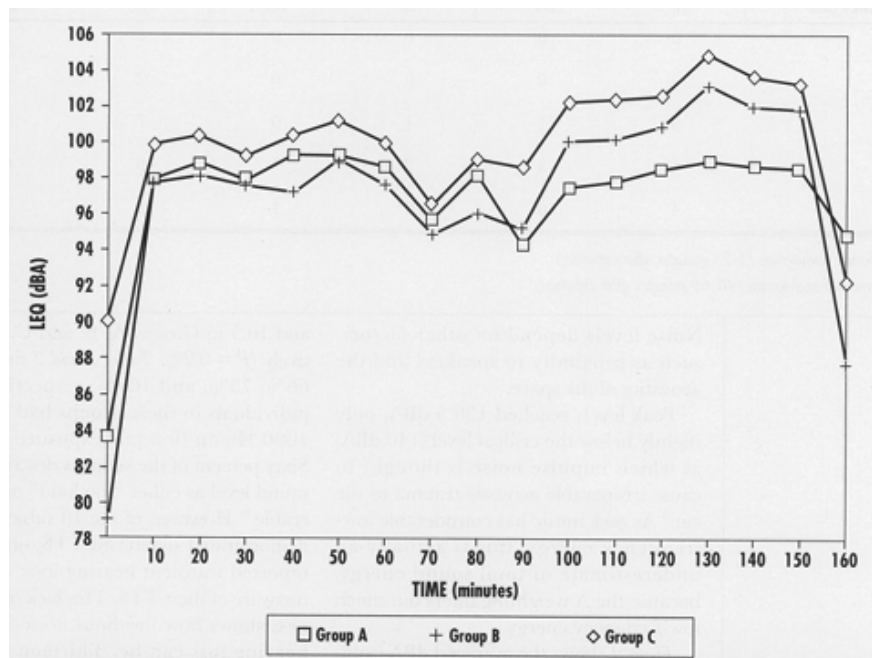


Image Credit: Canadian Family Physician

1. What are the three variables represented in the graph? Classify each variable as either numerical or categorical.
2. What do you notice about the graph? What do you wonder?
3. Based on the graph and the background information, do you think rock concerts pose a risk of hearing loss? Justify your position.

² Yassi, A., Pollock, N., Tran, N., & Cheang, M. (1993, May). Risks to hearing from a rock concert. *Canadian Family Physician*, 39, 1045–1050.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2379666/pdf/canfamphys00111-0049.pdf>

One possible way to minimize the risk of hearing loss at rock concerts is to wear earplugs. Researchers investigated whether providing free earplugs at concerts increases the proportion of attendees who wear hearing protection.

To estimate the percentage of people who wear earplugs at a rock concert and to investigate whether more people would wear earplugs if they were provided for free, researchers collected data from two concert venues of about the same size and that had similar floor plans and sound systems.³ At three rock concerts, free earplugs were provided at the entrance; for three other rock concerts, no earplugs were provided. Thirty minutes into each concert, people conducting the study observed each concert attendee, noting gender and whether they were wearing any form of hearing protection.

4. What are some questions that could be asked about the data collected in this experiment?
5. For all six concerts, the total percentage of attendees who were observed wearing hearing protection was 3.6%. What proportion of attendees were wearing hearing protection?
6. Do you think that the proportion of attendees wearing hearing protection will be exactly the same at every concert? Why?
7. Suppose that providing free earplugs does not increase the proportion of attendees who were wearing hearing protection. How would you expect the observed proportions of attendees wearing hearing protection to compare between concerts where free earplugs were provided and concerts where they were not? Explain your reasoning.
8. Would you expect these two proportions to be exactly equal? Why or why not?
9. The two observed percentages were:
 - Earplugs provided: 8.2%
 - Earplugs not provided: 1.3%Calculate the difference in proportions (Earplugs provided – Earplugs not provided).
10. Do you think that a difference in proportions as great as what you just calculated might just be due to chance if providing earplugs does not increase the likelihood that an attendee will use hearing protection? Explain your thinking.

³ Cha J., Smukler S. R., Chung Y., House R., & Bogoch, I. I. (2015). Increase in use of protective earplugs by Rock and Roll concert attendees when provided for free at concert venues. *International Journal of Audiology*, 54(12), 984–986, Article 1080863. <https://doi.org/10.3109/14992027.2015.1080863>

Big Questions: Is It Significant?

Instructor Notes

Section 3: Do Earplugs Work?

OVERVIEW

Students explore statistical significance by analyzing real-world data about hearing protection at rock concerts. The activities guide students to interpret graphical displays, calculate proportions, conduct simulations, and evaluate whether observed differences in proportions are statistically significant. Students also reflect on the practical significance of the results to make informed recommendations.

LEARNING OUTCOMES

- Develop mathematical habits of mind, such as engaging in sense-making, communicating effectively verbally, in writing, and using graphical displays, justifying conclusions, and critiquing their own work and the work of their peers.
- Reason, model, and communicate with and about quantities, ratios, rates, proportions, and percentages, using equivalent forms when appropriate, to investigate and describe relationships, and to solve problems.
- Demonstrate distributional thinking by recognizing the distinction between individual values of a variable and the distribution of the values of a variable.
- Interpret probabilities in context and use probabilities to inform decision-making.
- Use simulation to estimate probabilities.
- Make connections between probability and sampling models.

SUGGESTED PACING

🕒 Two 45-minute days

PREREQUISITE SKILLS

- Understanding of probability and proportions
- Familiarity with interpreting graphs and distributions
- Familiarity using technology for simulations
- Computers or tablets with internet access for the Rossman/Chance applet: [Two Population Proportions Simulation Tool](https://www.rossmanchance.com/applets/2021/twopoppprop/twopoppprop.html).⁴

⁴ Chance, B., & Chance, F. (2026, April 24). *Two population proportions simulation tool*. Rossman/Chance Applet Collection. Retrieved June 10, 2026, from <https://www.rossmanchance.com/applets/2021/twopoppprop/twopoppprop.html>

FACILITATION NOTES

ENGAGE (10 MINUTES)

- Introduce the central question:
- How can we use data to evaluate whether providing free earplugs at rock concerts makes a difference in using hearing protection?
 - Ask students about their experiences with loud activities to activate prior knowledge and to connect the topic to real life.
 - Provide background information.
- Explain the decibel scale and how it is not linear. Explain that an increase of 10 dB represents a sound 10 times louder.
- Emphasize the risks of prolonged exposure to loud noises, referencing the thresholds for hearing damage.
- Use the decibel tables to contextualize noise levels at rock concerts and other loud activities.
 - Facilitate a discussion to encourage curiosity and critical thinking.
- Ask students if they are surprised by any examples in the table.
- Encourage them to think of other loud activities and to estimate where they might fit in the table.
 - Use visuals to support the explanation of the decibel scale (e.g., display the decibel tables on a projector or whiteboard).
 - Relate the discussion to students' experiences, such as attending concerts, sporting events, or using headphones at high volumes.
 - Emphasize the real-world relevance of the topic by discussing the long-term consequences of hearing loss.
 - Transition to the *Explore* portion by explaining that students will analyze real-world data to evaluate whether providing free earplugs at rock concerts is effective.

EXPLORE (60 MINUTES)

- Present the graph showing noise levels at three locations in a concert arena (groups A, B, and C).
- Help students interpret the graph by guiding them through identifying the variables and key patterns.

- Highlight the differences in noise levels across locations and over time.
- Connect the noise levels to the thresholds for hearing damage discussed earlier.
 - Facilitate a class discussion to summarize findings.
- Ask students to explain what the graph reveals about noise levels at rock concerts.
- Discuss how the data support the need for hearing protection, referencing specific noise levels that exceed safe thresholds.
 - Introduce the earplug study.
- Explain that researchers investigated whether providing free earplugs at concerts increases the proportion of attendees who wear hearing protection.
- Present the observed data:
 - 8.2% of attendees wore hearing protection when earplugs were provided.
 - 1.3% of attendees wore hearing protection when earplugs were not provided.
 - The difference in proportions is 6.9% (0.069).
- Pose the question:
 - Could a difference this large occur by chance if providing earplugs doesn't actually make a difference?
 - Throughout the section, use guiding questions to help students interpret the graph.
- What do you notice about the noise levels over time?
- Are there any patterns or differences between the three locations?
 - Encourage students to connect the data to the risk of hearing loss and the importance of hearing protection.
 - Emphasize that the observed data is a starting point for further investigation using simulations.
 - Guide students through the simulation using the Rossman-Chance applet.
- Explain the assumption: If providing free earplugs does not make a difference, the true proportion of attendees wearing hearing protection is 3.6% for both groups.
- Demonstrate how to set up the simulation:
 - Enter 0.036 as the probability of success for both populations.
 - Set the sample sizes to 318 (earplugs provided) and 637 (earplugs not provided).
 - Generate 1,000 simulated differences in proportions and observe the resulting distribution.
 - Before students begin the simulation, demonstrate how to use the applet step by step.
 - Encourage students to describe what they notice about the simulated distribution (e.g., center, spread, shape).

- Use probing questions to help students connect the simulation results to the observed data, such as:
- *How does the observed difference compare to the simulated differences?*
- *What does this tell us about whether the observed difference is surprising?*
 - If students struggle with the applet, consider pairing them with a peer or providing additional guidance.
 - Discuss the results of the simulation.
- Highlight that the simulated differences are centered around 0, as expected under the assumption of no difference.
- Point out that most simulated differences are small, but larger differences occasionally occur due to random variation.
 - Facilitate a discussion about statistical significance.
- Remind students that a small p -value indicates the observed difference is unlikely to occur by chance, showing that providing free earplugs may increase hearing protection use.
- Emphasize that statistical significance does not guarantee practical significance.
 - Facilitate a class discussion to summarize key takeaways.
- *How do simulations help us evaluate whether observed differences are surprising?*
- *Why is it important to consider both statistical and practical significance?*
 - Encourage students to reflect on the implications of the study.
- *Does the evidence support providing free earplugs at rock concerts?*
- *What other factors might influence the effectiveness of this intervention?*
 - Reinforce the distinction between statistical and practical significance by providing examples from other contexts.
 - Encourage students to think critically about the limitations of the study, such as sample size or external factors that might affect hearing protection use.
 - Use student reflections to identify common misconceptions and address them in a follow-up discussion.

ISQR is a 3rd or 4th year high school course designed to engage and prepare students for college and the workforce.

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LEARN MORE

<https://www.utdanacenter.org/integrated-statistics-and-quantitative-reasoning>

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