SLQ: Scientific Reasoning, Laboratory or Fieldwork Experience, Quantitative Literacy

For ‘S’ or ‘L’ designation, courses should satisfy 3 of the 4 listed criteria. For ‘Q’ designation, courses should satisfy 8 of the 32 criteria. *If courses do not satisfy this number of criteria, ‘S’, ‘L’, or ‘Q’ designation may still be possible.* In such an event, faculty wishing to designate their courses ‘S’, ‘L’, or ‘Q’ may explain their reasoning in accompanying comment boxes.

SLQ course designation is available through the Garnet Gateway, under “Course Maintenance Menu”. Following are the criteria and, in some cases, an abridged form of the comments that appear online.

**Scientific Reasoning (‘S’) Designation**

1. This course includes elements that demonstrate the process of scientific thinking.
2. This course includes examinations of the ongoing development of theories, especially those used to describe the phenomena of the empirical world.
3. This course involves students in learning reasoning skills that enable them to derive conclusions which are based upon scientific evidence.
4. This course involves students in learning the skill of critiquing and evaluating scientific evidence and its limits.

**Laboratory or Field Work Experience (‘L’) Designation**

To qualify for designation as a laboratory or fieldwork course, at least one-quarter of the total number of hours the class meets should be devoted to laboratory or fieldwork activities.

1. This course includes a laboratory or field work component that engages students in the design of experiments or in making their own measurements or observations.
2. This course includes a laboratory or field work component that engages students in the consideration of the factors which render data or observations valid for use as scientific evidence.
3. This course includes a laboratory or field work component that teaches students how to critically evaluate data or observations and think critically about the conclusions that can be drawn from data or observations.
4. This course includes a laboratory or field work component that demonstrates the predictability and reproducibility of outcomes, based upon prior measurements or observations.
Quantitative Reasoning (‘Q’) Designation

Arithmetic
1. Having facility with simple mental arithmetic
2. Estimating arithmetic calculations
3. Reasoning with proportions

Data
4. Using information conveyed as quantitative data, graphs, and charts
5. Drawing inferences from quantitative data
6. Recognizing sources of error in collected quantitative data

Computers
7. Using spreadsheets to record data
8. Using spreadsheets to perform calculations
9. Fitting lines or curves to data, or creating graphic displays of data
10. Extrapolating from data

Modeling
11. Formulating quantitative problems, seeking patterns, and drawing conclusions
12. Recognizing interactions in complex systems
13. Understanding linear, exponential, multivariate, and simulation models
14. Understanding the impact of different rates of growth

Statistics
15. Understanding the importance of variability
16. Recognizing the difference between correlation and causation
17. Recognizing the difference between randomized experiments and observational studies
18. Recognizing the difference between finding no effect and finding no statistically significant effect (especially with small samples)
19. Recognizing the difference between statistical significance and practical importance (especially with large samples)

Chance
20. Recognizing that seemingly improbable coincidences are not uncommon
21. Evaluating risks from available evidence
22. Understanding the value of random samples

Intended Outcomes for Students
23. Comfortable with quantitative ideas and at ease applying quantitative methods
24. Routine use of mental estimates to quantify, interpret, and check other information
25. Understanding the role of mathematics and statistics in scientific inquiry and technological progress
26. Understanding the role of mathematics and statistics in comprehending issues in the public realm
27. Analyzing quantitative evidence and reasoning carefully
28. Questioning assumptions and recognizing quantitative fallacies
29. Using mathematical tools in context-based settings
30. Adapting to changes in notation, problem-solving strategies, and performance standards, depending on the specific context
31. Having accurate intuition about the meaning of numbers and common sense about employing numbers as a measure of things
32. Knowing how to solve quantitative problems they are likely to encounter at home or at work