**Components of a Lesson Plan**

Background of the Assignment or Exercise.

Why is the lesson important for the specific course you teach or in general? Does it address a problem or task that students find challenging? Does the assignment or exercise address a new component in your syllabus or a revision to improve how the material is taught? What is covered in the course prior to the specific lesson that is relevant to the assignment.

Learning Objectives.

What should students be able to demonstrate after instruction?  In framing learning objectives, it is usually best to use verbs that capture what the student is doing if successfully meeting the objective. **See examples at end of this document.** The learning objectives should be organized under the elements of quantitative reasoning that you identify as relevant to the assignment or exercise:

* Skills necessary to search for and manipulate numerical materials
* Knowledge and conceptual understanding of numerical materials and their relevance.
* Thinking about how to apply and structure numerical materials to provide evidence for statements, arguments, and decision making
* Communication of evidence and findings to both general and technical audiences
* Attitudes and values influencing confidence in one’s ability to use and understand numerical materials as well as the political and cultural context of data collection, presentation, and decision making.

Time Required for Instruction.

Number of in-class hours devoted to instruction for the lesson.

Written Instructions.

Provide stand-alone written instructors for the assignment or exercise. This is helpful to students and other instructors that might use a version of the lesson in the future.

Materials Required for Assignment or Exercise & Format.

What materials are necessary for the student to complete the assignment or exercise and how are they accessed. For example, printed instructions, links to digital materials, statistical tables, reference materials, calculators, computers and software, etc.

Assessment Plan & Instruments.

How will student learning be evaluated?  The outcomes of instruction should be narrowly focused on the learning objectives you have articulated in the lesson plan rather than the course in general.

1. Your assessment plan should describe how and when the assessment will be carried out and how you will work with the information from the assessment.
2. Your assessment instrument should correspond to the specific learning goals that you have developed.

A pre and post-test design tracking individual performance before and after instruction is preferable, so that individual gains can be assessed as well as overall class performance. Students may be reluctant to answer questions before having completed instructional assignments or exercises. You can emphasize that an initial assessment is a way for the instructor to know what he/she should focus on in teaching new material. Legitimate response categories can include a “don’t know” answer.  **Note that there should be some incentive or requirement for students to answer the pretest, perhaps earning participation points.** The pre-test can also include questions about previous courses taken that would be useful in the present course, previous use of computer programs, self-rated confidence using math, or other factors that may affect learning from the lesson.

**Examples of QR Leaning Objectives with Verbs**

**Describing Actions to Be Accomplished Following Instruction**

Skills

* Calculate (specific statistic/formula)
* Code information into mutually exclusion and exhaustive categories
* Use an online search engine to find (research or data) on a specific topic.
* Measure exact quantities
* Operate a statistical program (EXCEL, SPSS, …) to generate (statistics, graphs, …)
* Program instructions for a computer program
* Record data

Knowledge and Conceptual Understanding

* Cite possible values for a statistic (lower and upper bounds…)
* Classify variables in a (word problem, research article,…) as dependent, independent, or control variables.
* Define statistics that measure (central tendency, dispersion,…)
* Describe method(s) of data collection and when they are employed
* Estimate expected values of a calculation given the type of process represented
* Explain how (poverty, other concept) is measured by the (Census Bureau, other organizations).
* Select appropriate statistics for measuring association between variables
* Understand a research article

Thinking about how to apply and structure evidence for statements and arguments

* Analyze data on (a specific topic) and its meaning
* Compare appropriate statistics (measuring public opinion….  overtime or for different groups) and draw conclusions about (trends, differences).
* Compile statistics to create a picture of a current or historical period as a context for judging events or literature
* Evaluate the adequacy of data on a (specific topic).
* Formulate alternative hypothesis about causality
* Interpret numerical evidence on (a specific topic) and its implications

Communication

* Write about numbers in data analysis for a technical and general audience
* Create tables showing results of data analysis
* Create visual representations of numerical materials (maps, graphs, and other info-graphics)

Attitudes and Values

* Recognize cultural differences in (reporting information, vocabulary…) that impact data collection and what is perceived as evidence
* Recognize the political context of data and what data is presented when judging arguments
* Recognize ethical issues in data collection and presentation
* Recognize the value of empirical evidence
* Self-confidence in ability to use math and understand numerical materials