



14 February 2020

## Lesson Plan

<i>Title</i>	Experimental Data: Design, Collection and Analysis
<i>Subject</i>	STEM: Data Science
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<i>Grade level</i>	Eleventh
<i>Time duration</i>	One hour and 20 minutes
<i>Overview</i>	“Good Data” is the key to scientific success. A well designed experiment produces a manageable volume of quality data organized and stored in an accessible format for use by the scientific community and others.
<i>Objective</i>	Students will learn key criteria for evaluating and producing quality data, and will gain experience in using data collection and management tools.
<i>Materials</i>	Internet- connected computers (at least 4) with Google Sheetz or similar Printer available for printing spreadsheets and data Raspberry Pi or Arduino data collection devices: These can be: <ul style="list-style-type: none"><li>- Devices already used in class (preferred, for future activities)</li><li>- Devices brought by TIS (temperature sensor and data logger)</li></ul> Data files in .csv and .xls format preloaded on computers
<i>Activities and procedures</i>	<b>:05 Discuss:</b> What is data? Definition, examples, uses, quality attributes <b>:05 Explore:</b> Example data outputs: screen, webpage, .csv <b>:20 Skill:</b> Open a .csv in text reader, then spreadsheet for temperature, time. Save and rename file. Add headers. Count records and duration. Edit cells, rows, columns. Format cell. Calculate difference between start and end times. Sort. Copy. Delete. Undo. Chart: Temperature over time. Help. <b>:10 Hands on with data sensors:</b> Temperature sensors: what they collect. <b>:10 Data design:</b> Plan data collection for temperature experiment <b>:10 Data Analysis:</b> Validation and verification of collected data <b>:20 Presentation Design:</b> Identify users, use cases, data access options.
<i>Conclusions</i>	Students will realize that experiment success requires good data design. Participation will provide students some key tools and criteria for designing and testing experimental data collection.