

Points of Emphasis in M211

Often, coursework with data is focused on performing computations by hand or by using a handheld graphing calculator. Instead, students should be given continuous opportunities to:

- use spreadsheets to examine the nature of data before manipulating it in order to gain insights about the relationships involved, to organize and merge data sets to prepare them for predictive modeling, and apply spreadsheet formulas to help describe key features of data sets (LP 7).
- use tools within spreadsheets and coding languages to allow for a sharp focus on understanding summary statistics and key features of data, rather than computing statistics and drawing data visualizations by hand (LP 7).
- access online tools and resources such as databases, integrated development environments, videos, and data analysis platforms to allow for creating data visualizations, collecting data ethically, and summarizing key features of data (LP 7).

Students should also be given opportunities to understand and reflect on the ways that data management and visualization can authentically involve real-world situations (LP 6).

Whereas a typical instructional unit on data management might begin with a focus on students performing computations or manipulating data disconnected from real-world contexts, in M211, students should:

- examine the structure of data before manipulating it in order to gain insights about the relationships involved (LP 3).
- have opportunities to understand and explain why different data visualizations produce similar interpretations about their key features (LP 3).
- recognize that different forms of data visualizations are helpful for different purposes or for particular contexts (LP 3).
- regularly encounter real-world tasks involving data management (LP 1) that require them to make sense of multiple representations and how they relate to each other—verbal, algebraic, numerical, graphical (LP 3).
- frequently collaborate, share their solution methods, and make their thinking visible (LP 2).

Specifically, in M211, students should:

- regularly engage with tasks that focus on understanding and reasoning about different representations—verbal, numerical, graphical. As examples, students should be asked to do the following:
 - Reason about and explain the real-world meaning of data visualizations.
 - Make connections between the different visual representations of a situation.
 - Engage with a variety of data sources and visualizations to reason about having similar or different key features of their graphs.
 - Hypothesize about relationships between variables by determining if there appears to be a positive, negative, or no association between the variables.

- Determine the reasonableness of using certain variables and observations to make sense of data.
- Interpret data visualizations in the context of a situation.
- Identify, analyze, and synthesize relevant external resources to pose or solve problems.
- Identify important quantities in a practical situation and map their relationships (LP 3).
- Evaluate the ethics of a data collection process, as well as identify any bias.
- use open-ended tasks to interpret data, analyze graphs, and reason about the context (LP 3).
- have opportunities to share their reasoning with partners or in groups, allowing for practice sharing, critiquing, and revising their arguments to include social interaction as part of the learning process (LP 2).