St. Olaf College OLE Core General Education Curriculum
Quantitative and Computational Reasoning Requirement

Description:

Students gain knowledge of quantitative and computational methods. They learn how to apply quantitative and computational problem-solving and knowledge in specific contexts.

Intended Learning Outcomes:

Students will:

1. Represent and interpret information in numeric, symbolic, or graphical forms.

2. Identify and use quantitative and computational approaches to solve a problem in context.

3. Evaluate interpretations derived from quantitative analysis.

Course Guidelines:

1. **Represent and interpret information in numeric, symbolic, or graphical forms.**
   Students will engage in the process of representing and interpreting information presented in numerical, symbolic and graphical forms. They will receive instruction in the use of basic mathematical and/or statistical skills used to represent and interpret information. They will use these skills to interpret arguments and draw conclusions. Students will communicate and interpret information symbolically, visually, and/or numerically.

2. **Identify and use quantitative and computational approaches to solve a problem in context.**
   Students will be able to identify how and when a complex problem can be broken into smaller, more tractable parts. They will identify and use tools and approaches to explain patterns and to solve problems arising in a specific disciplinary or interdisciplinary context. These analyses might be used to draw conclusions, make predictions, inform critiques, identify possible causal relationships, or support arguments. Some examples of quantitative and computational approaches include algebra, algorithmic design, mathematical models, spreadsheet computations, statistics, and writing computer code. Problem solving should be interpreted broadly to include advancing knowledge and providing critical insights to questions arising in a disciplinary or interdisciplinary context.

3. **Evaluate interpretations derived from quantitative analysis.**
   Students will critically evaluate their own and/or others' quantitative analyses. They will demonstrate recognition of the assumptions or limitations inherent in the conclusions derived from quantitative and computational methods. They will be able to make judgments in the "absence of sufficient information or in the face of inconsistent evidence" (Steen, 24, 2004). As appropriate, students will be able to compare the merits of various approaches for addressing a particular problem in context.

Useful Sources:

Elrod, Susan. Quantitative Reasoning: The Next "Across the Curriculum" Movement. https://www.aacu.org/peerreview/2014/summer/elrod. 2014.

Pollock, Lori, Chrisytalla Mouza, Kevin Guidry, and Kathleen Pusecker. Infusing Computational Thinking across Disciplines: Reflections and Lessons Learned. https://dl.acm.org/doi/pdf/10.1145/3287324.3287469?casa_token=DbO9fIUX5IEAAAAA:OgbDp2ADiURt8HeZsuX3oO-a0buayzeSlZvIQ3d5MtGdeGLfVAMllzuGQ2XBcZF5j-5aJkpPqyY. 2019.

Shute, Sun, Asbell-Clarke, "Demystifying computational thinking," Educational Research Review, 2017, https://www.sciencedirect.com/science/article/pii/S1747938X17300350.

Steen, Lynn. Achieving quantitative literacy: An urgent challenge for higher education. Mathematical Association of America. 2004.