

Learning Goals for Mathematics and Statistics

Department of Mathematics and Statistics at Colby College

1 Analysis and Comprehension

Successful students of mathematics and statistics should be able to:

1. Read, understand, and create sophisticated arguments presented in a combination of words and mathematical notation; identify the underlying assumptions and distinguish a valid argument from a fallacious one.
2. Create a cohesive mental landscape of an intricate theory, identifying the big ideas, separating them from the technical details, and seeing how the pieces fit together.
3. Understand and employ the processes of abstraction and specification through which examples lead to creation of a general theory and a theory is used to solve specific problems, understand concrete situations, handle real-world data, and provide a framework for further research.

2 Problem-solving

Successful students of mathematics and statistics should be able to:

1. Make a judicious selection of analytical and/or descriptive tools appropriate to the problem at hand, informed by the knowledge of theory and based on experience.
2. Express vague ideas precisely in mathematical terms, when appropriate, so that mathematical and statistical methods can be used to bring clarity to questions in other areas of inquiry.
3. Identify and understand conditions of validity for methods and results, and have an idea of what to do when those conditions are not satisfied; recognize that the methods through which real-world data is obtained impact both the conclusions and the generality of the analysis.

4. Become proficient at using powerful discipline-specific software packages for calculation, experimentation and visualization.

3 Communication

Successful students of mathematics and statistics should be able to:

1. Express mathematical and statistical arguments in a written form at a level suited for various audiences in a way that is clear, organized, and follows the standards of the discipline.
2. Communicate mathematics and statistics orally and visually in a clear, organized, and inspiring way, using a variety of media in ways that are appropriate for the audience.

4 Mathematical and Statistical Culture

Successful students of mathematics and statistics should be able to:

1. Place mathematics and statistics in their human contexts: historical, social, and professional.
2. Know and understand the scientific community and the specific ways of mathematicians and statisticians; be aware of professional societies, meetings, literature, and reference journals.
3. Face complexity with equanimity and even delight, with anticipation of the satisfaction that issues from success in the struggle to understand.