

# Using the Game of Mastermind to Teach Experimentation Skills

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Mastermind is a code-breaking game that utilizes critical thinking skills similar to those necessary for scientific experiments and analyses (Strom and Barolo 2011). It can be used as a cheap and easily implemented ice-breaker activity on the first day of lab that also promotes student engagement, communication and critical thinking. The only materials needed are colored crayons and student handouts (see Appendix A and B). Mastermind can be used to illustrate concepts such as controlled variables in experiments, the benefits of negative data, and dangers of over-interpreting data. By playing a simple and fun game in lab students are able to practice their critical thinking, communication and collaboration skills. Students can also concretely experience improvement in these skills with practice over a single lab period. We've found this to be a fun way to get both major and non-major students talking, thinking and motivated in lab from day one.

**Keywords:** critical thinking, game, experimental design

## Cited References

AR Strom and Barolo, S. 2011. Using the game of Mastermind to teach, practice and discuss scientific reasoning skills. *PLOS Biol.* 9(1).

## About the Author

Dr. Megan Cole is a Lecturer and Director of undergraduate laboratories for the Department of Biology

at Emory University. She has B.A. degrees in Biology and Computer Science from Amherst college and received her PhD in Biology from MIT where she studied genomics of embryonic stem cells. She did her postdoctoral training at Georgia Tech and Emory University where she was a Fellow in Research and Science Teaching as well an NIH NRSA Fellow. In her current position she develops authentic research experiences for undergraduates in introductory biology lab courses by bringing Emory Faculty research into the teaching labs.

# Appendix A

## Student Handout 1

### MasterMind

Gameplay:

- Code maker chooses an ordered pattern of 4 dots, duplicate colors are allowed.
- Code breaker tries to guess the pattern within 12 rounds
- In each round code breaker guesses what the code is and the code maker scores them:

 = correct color & position

 = correct color, wrong position

Guess				Result

**Appendix B  
Student Handout 2**

Hypothesis/Question	Experiment	Data	Conclusions				
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