

## Teaching Visualization of STEM topics with RStudio



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**When**

Saturday June 6, 2020

9:00 AM –4:00 PM

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**Where**Online

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**Instructor**

Dr. Kevin L. S. Drury (kdrury@huntington.edu)

Associate Professor of Mathematics

Department of Mathematics &amp; Computer Science

Huntington University, Huntington, IN

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### Workshop Description

This workshop is for STEM educators who would like to learn to use the *R* programming language as an educational tool. *R* is free and is widely used in academia, and industry. High school students interested in pursuing STEM degrees, and careers, may be able to leverage experience with *R* to increase their competitive edge.

We will begin by showing you how to create an account, and use RStudio Cloud on **your** laptop. RStudio is a free, intuitive, online graphical user interface for interacting with the (also free) *R* programming language. Once familiar with the interface, we will focus on two broad strategies common to many STEM fields: visualization & analysis. To do so, we must introduce several methods of getting data into the RStudio workspace. The best method depends on the goal, and quite likely, depends on your field. With data in computer memory, we will use a variety of exploratory data analysis strategies to visualize the data, and address the question, “what are our data mostly like?” At this stage, we are seeking patterns that may help us form hypotheses in science fields, or build intuition from which to form conjectures in math.

Armed with our hypotheses, in the first half of the workshop (before our 1 hr brown-bag lunch break), we will focus on statistical summaries of the data, perform hypothesis tests, and construct intuition-building simulations. In the 2<sup>nd</sup> half of the workshop, we will introduce methods of analyzing mathematical functions, including generation of solutions, visualizations of solutions, and numerical approximations to solutions for those functions for which no analytical solution is possible. Finally, we will iterate a few famous mathematical functions that generate incredibly beautiful images (e.g., chaos & fractals). These are at least engaging, and for some students, quite captivating, hopefully providing motivation to explore the underlying mathematics. Teachers will leave this workshop equipped with the data, and code, with which to reproduce, and build upon, all our examples.