

# Tools and Resources for Educators: Teaching Quantitative Thinking in Geoscience with MATLAB

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## Abstract

Computational geoscience courses often combine domain science, math, programming, and hardware instrumentation. Ensuring students master all those skills can be daunting for professors, as well as for students who tackle these hybrid classes. Through a series of 3-day in-person workshops, faculty across the geoscience disciplines and allied science fields have collaborated to produce on-line teaching resources and a community of peers to support these multi-faceted but essential Geoscience courses. These resources support Geoscience and Science educators seeking to update their curriculum and even create whole new courses. Topics addressed include approaches to teaching, best practices for working group design, empowering students to self-advocate, building computational skills optimally, and coordinating curriculum across a department and even cross-departments. This e-lightning talk will show the resources available to educators – teaching activities including MATLAB code, presentations on teaching approaches, and course curriculum, among others. It will also highlight relevant MathWorks tools for learning and teaching, from online videos, to free, interactive MATLAB tutorials (MATLAB Onramp and more), to autograding software for MATLAB code (MATLAB Grader), with associated publicly available homework problem sets. Attendees will learn where and how to access these online resources, share their teaching challenges, and participate in future workshops.

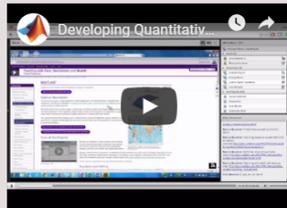


## Workshops to Web:



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## 100+ Peer-Reviewed...



There are over 100 educator-contributed and peer-reviewed teaching activities on the SERC web site. In this videocast, 3 faculty summarize their contributed teaching activities, including learning objectives, teaching strategies, and tips for educators.

### Teaching Activities Collection

- [Exemplary MATLAB Activities](#) (link)
- [Geoscience Specific Collection](#) (link)

### Example Activity

#### Signal processing and earthquake triggering

This teaching activity in the SERC MATLAB activity collection is a great example. It includes video.

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## Making Learning Fun:...

In this video, a Physics Ph.D and MATLAB expert demonstrates how to make learning physics and exploration in MATLAB enjoyable for students and teachers and even addictive. He demonstrates how via a combination of teaching through modeling programming live and MATLAB Live Editor.



### Real-Life Example:

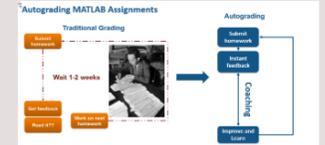
#### Analyze Temperature with NASA Data

Using subject matter that is inherently interesting, such as weather and the rising average temperature in this example, is one way to grab student interest. Using an exploration canvas/notebook-style is another, like this [MATLAB Live Script](#) pulled from a [faculty-contributed MATLAB teaching activity](#).



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## Assessment: Autograde...



**Assessment** is time consuming. Plus, timely feedback is a key ingredient to successful learning.

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## Online Resources:

The [Teaching Sciences with MATLAB](#) page points to 8 [discipline-specific pages for educators](#) that curate teaching materials, from textbooks to toolboxes to video tutorials, in addition to pointers for getting started teaching **Computational Thinking**.



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## Convert Your Course,...

There are lots of materials to help you get started teaching Computational Thinking skills to students of all levels. If you're already teaching it, peer-contributed resources can help you update your course.



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