

Teaching MATLAB to first year students using ungrading approaches

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The brand-new freshman in my mandatory introduction to MATLAB course for biomedical engineering majors arrive with a wide range of programming experience. Where some students have been programming for years, others go blank when I mention the concept. My goal has been to create a course that meets every student's needs by providing ground up programming knowledge for my novice students and interesting challenges for those with experience.

My students are all either biomedical engineering or biology majors and so I try to put MATLAB knowledge in the context of their chosen career. We learn basic functions and skills and then apply them to relevant problems in the field. MATLAB provides an opportunity for efficient data processing and elegant presentation. I discuss with my students how tasks can be automated with MATLAB and how it can be used as a tool to their advantage. We practice reading data from Excel spreadsheets, processing it using computation approaches, and presenting the story of that data through plotting. We also use MATLAB to compute bone density, brain atrophy, and perform Procrustes analysis to compare skulls of different species.

A major challenge of this class is that my students are terrified to make mistakes and struggle with code debugging and independence. I have adopted an ungrading approach to this course that allows for frequent revisions that I believe creates a safer space for students to learn. We also have specific assignments that encourage independent learning and debugging. By the end of the course, I do not expect my students to be master programmers, however, I do expect a certain level of comfort with the software and confidence in their ability to learn more. Themes from my past course evaluations suggest that my students DID learn, CAN learn, and WANT to learn MATLAB.