Teaching and Learning with MATLAB and Simulink

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Overview

- What is MATLAB Grader?
- Who benefits from autograding MATLAB code?
- What can instructors use MATLAB Grader for?
- How it works (Product Demo)
- User Stories and Case Studies
- Teaching and Learning Resources
- How to get started using MATLAB Grader

What is MATLAB Grader?

Traditional Grading

Submit homework

Wait 1-2 weeks

Get feedback

Read it??

Work on next homework

Autograding

Submit homework

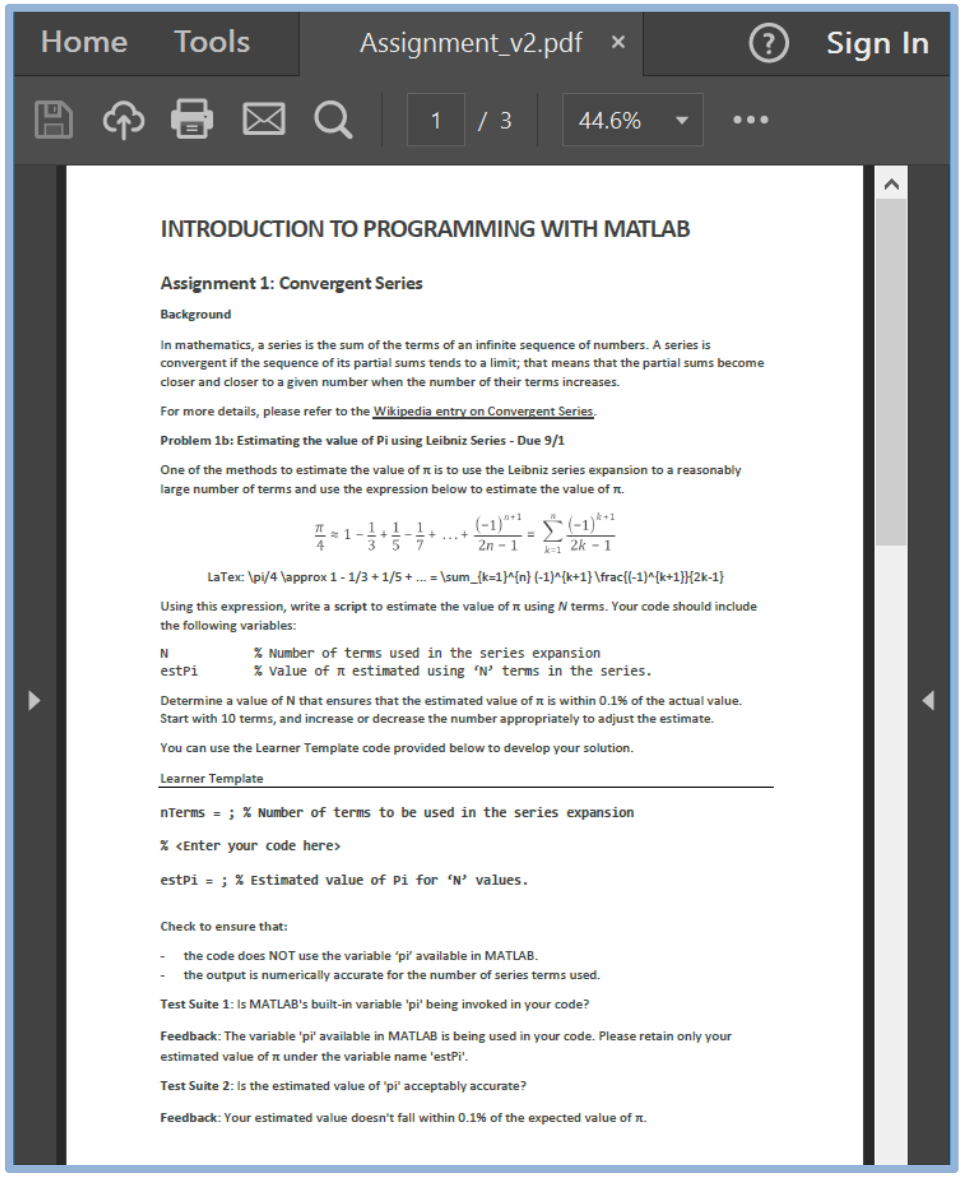
Instant feedback

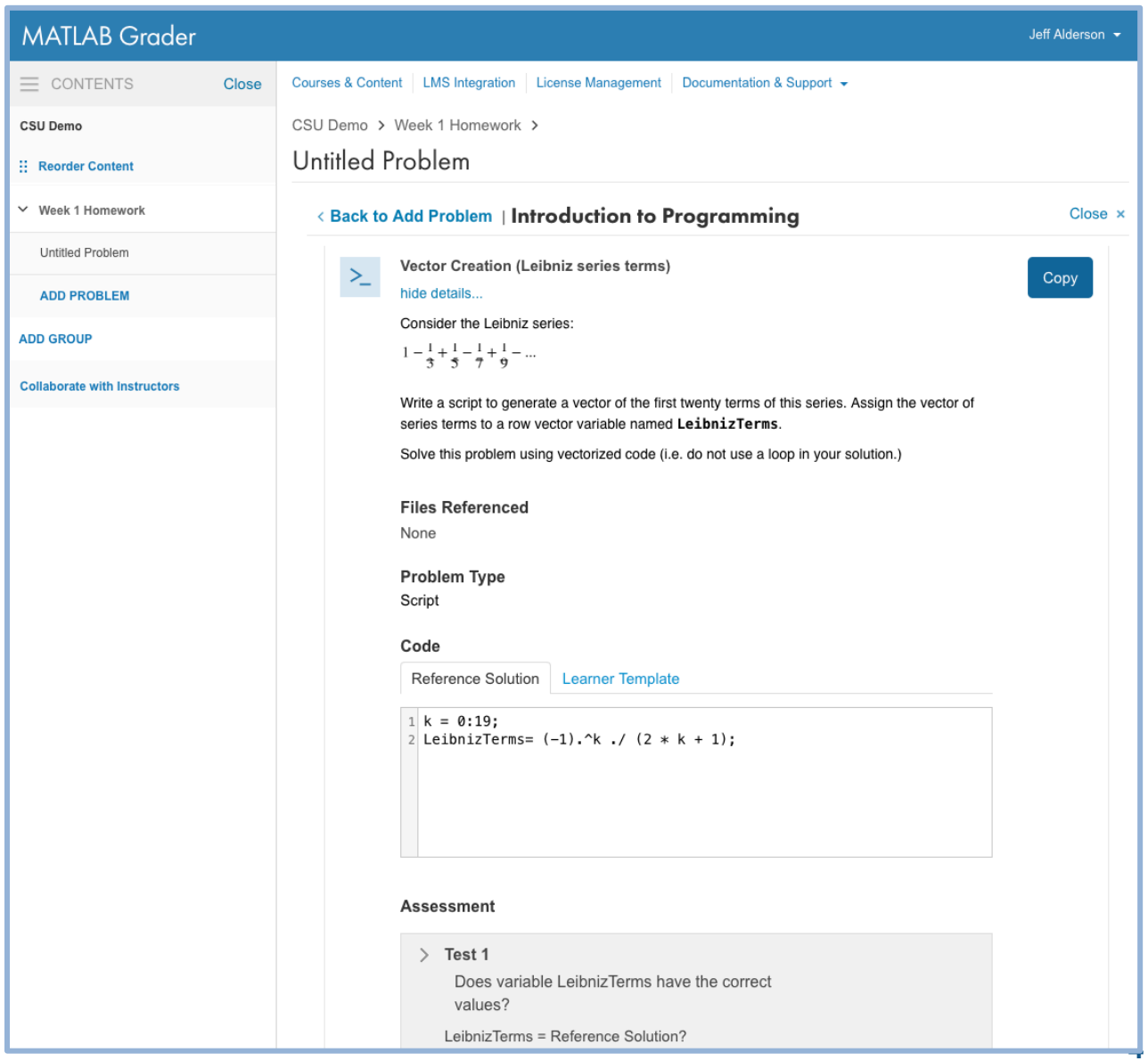
Improve and Learn

Work on next assignment

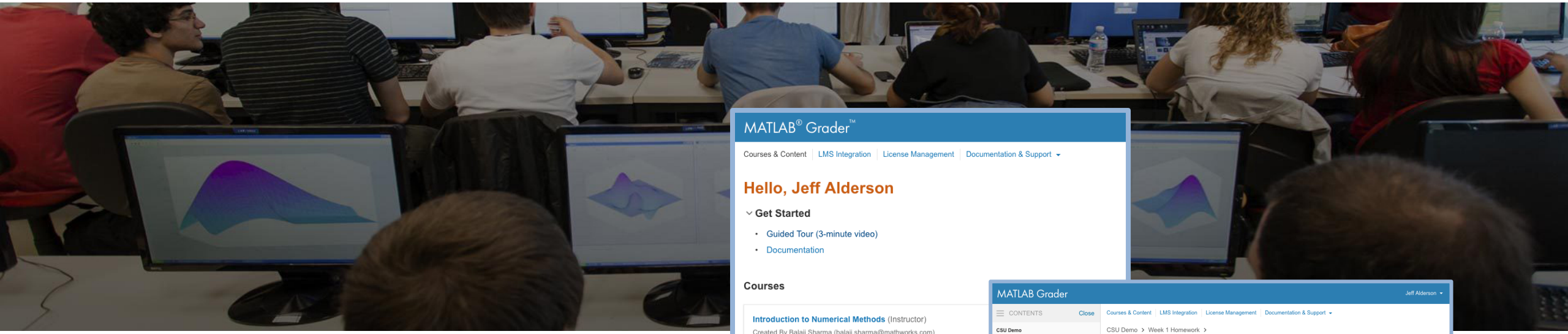
Resubmit

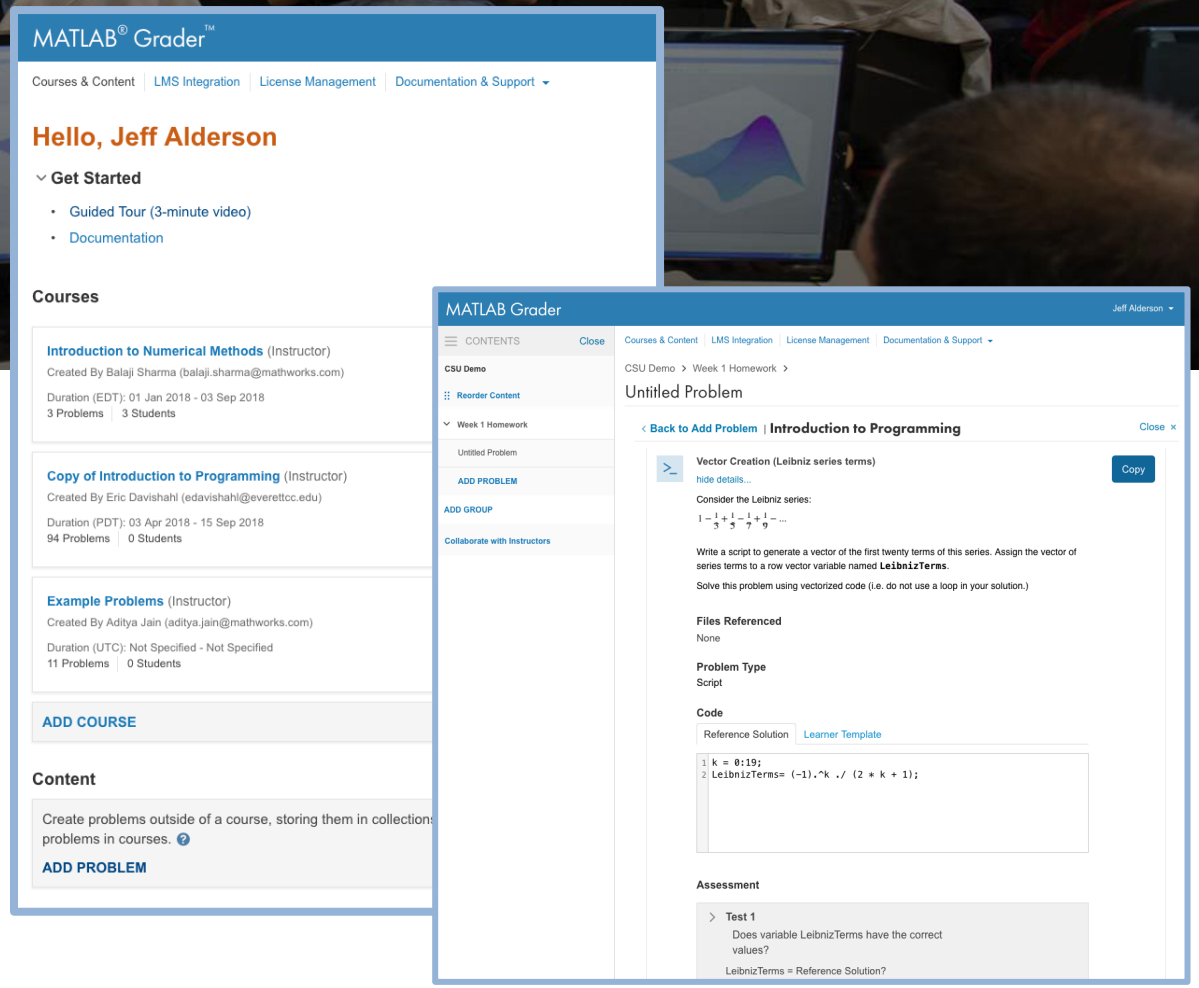
Transitioning from traditional assignments





MATLAB Grader





Create interactive course assignments

Automatically grade student work and provide feedback

Run your assignments in any learning environment

Who will benefit from autograding MATLAB code?

- Instructors teaching large and/or introductory level courses
  - Off the shelf content and assessment examples to accelerate course development
  - Include MATLAB assignments for homework, exercises, and formative assessment
- Teaching Assistants and Graders for MATLAB-based courses
  - Less time spent grading code == more contact time with students
- Students get immediate feedback while mastering MATLAB skills and concepts

What can customers use MATLAB Grader for?

- Create and store MATLAB based assignments in a repository for later use
- Provide students with additional practice problems in the LMS
- Use MATLAB Grader for in-class coding exercises and quizzes
- View student performance analytics at the individual and aggregate levels.

Educators and Instructors are Teaching with MATLAB Grader

1,000+ instructors

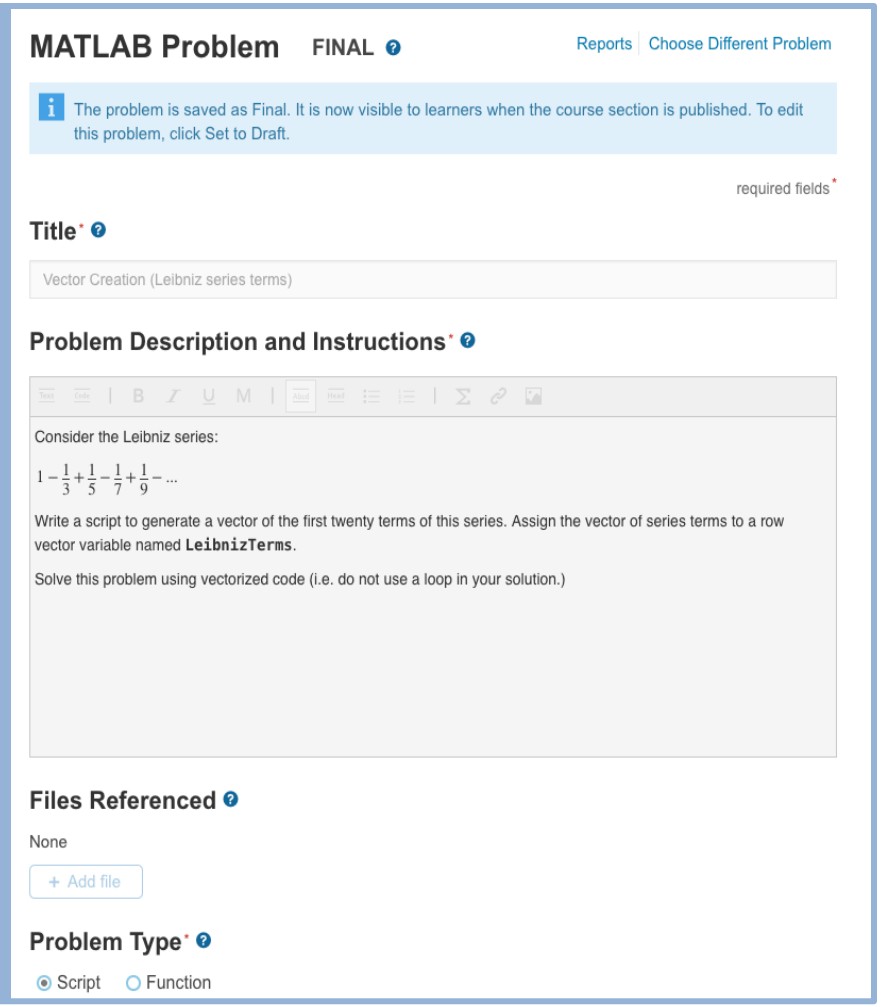
100,000+ students

Over 6 million student submissions

What is LTI?

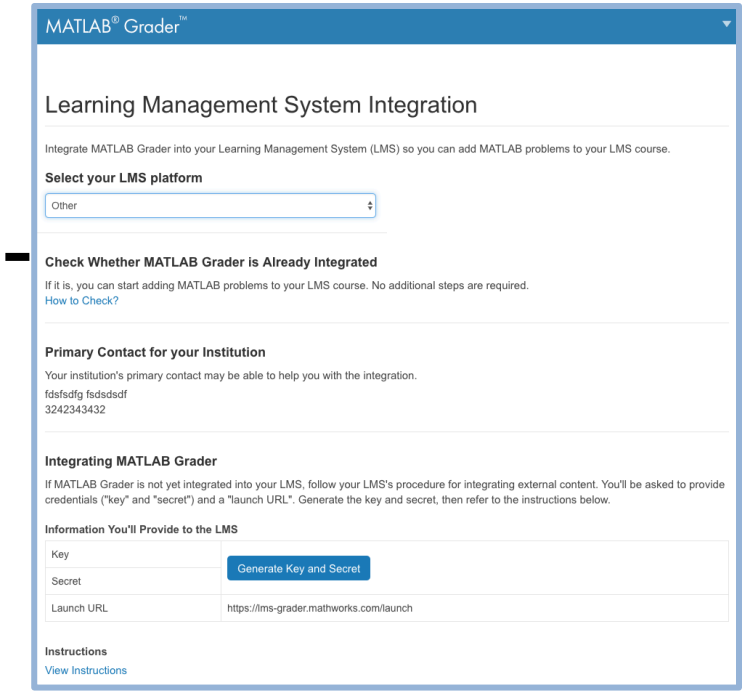
- LTI: Learning Tool Interoperability
- It's the widely adopted, industry standard that lets our application integrate with major LMS platforms.
- Nearly every LMS supports it

Learning Management System

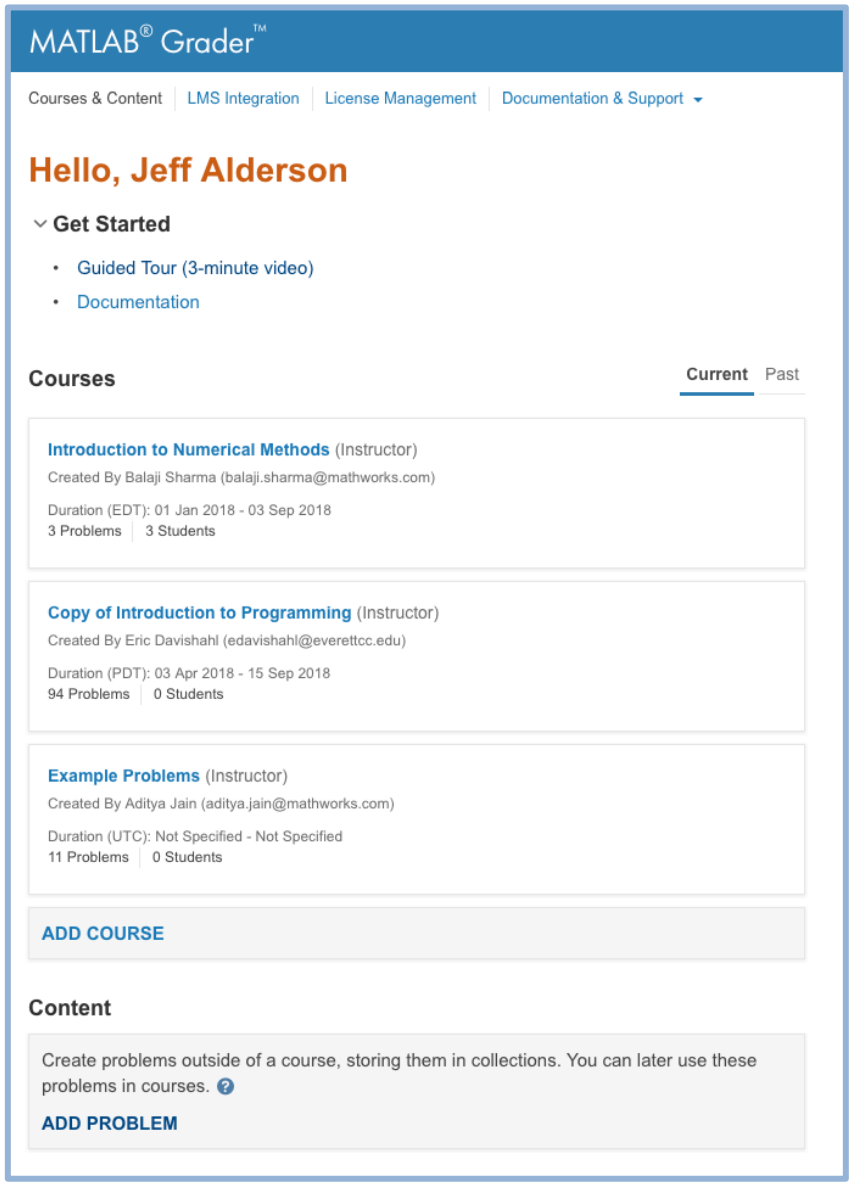


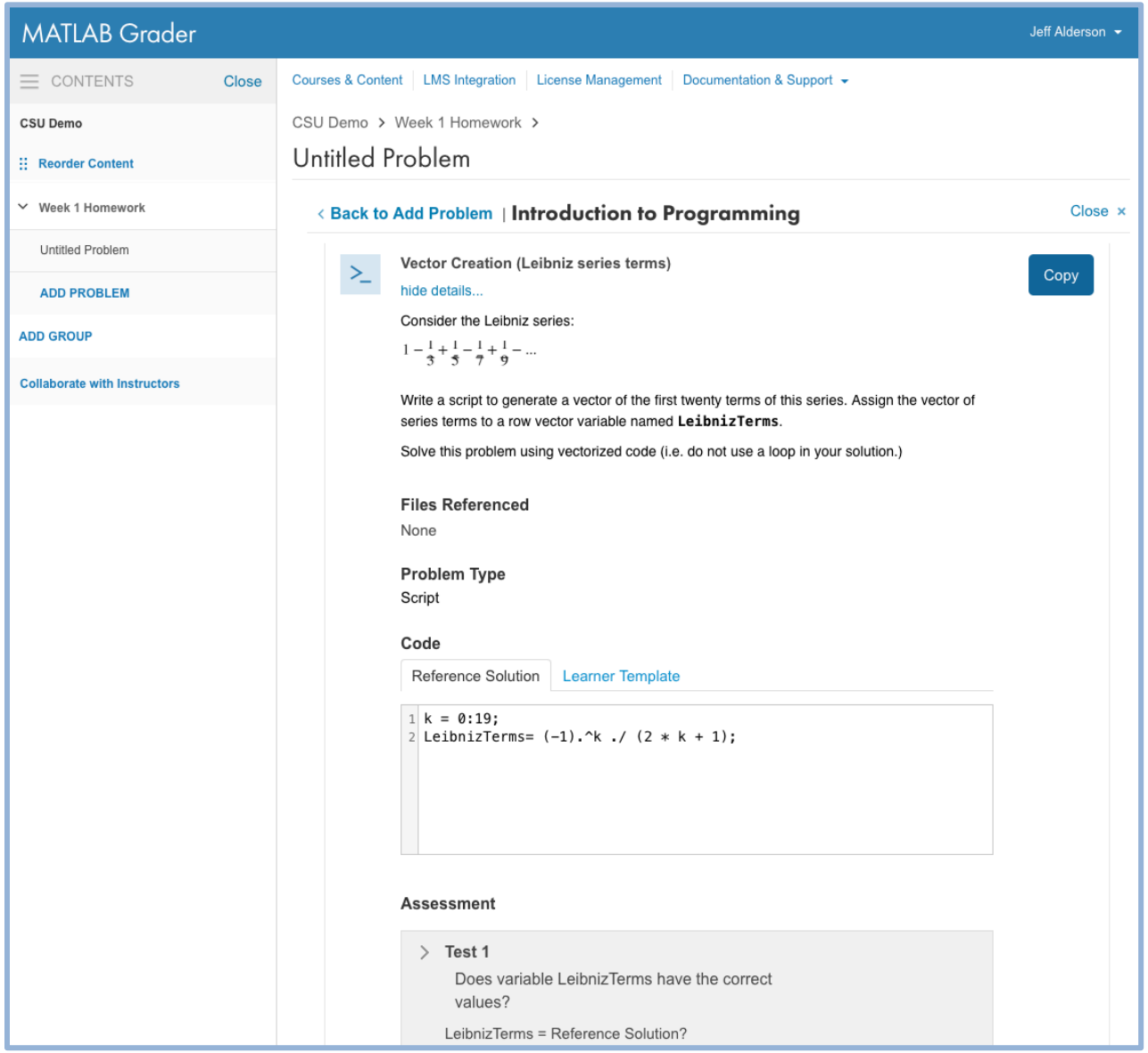
Score (0…1)

Course ID
Resource ID
Anonymous User ID
Role
Institution Credentials



MATLAB Grader Product Demo





MATLAB Grader Product Demo

Instructor Workflow

Create Content

Add a problem from Examples
Create a problem from scratch
Add to course syllabus

Share Content / Courses

Invite TAs/graders/instructors

Invite students

Assess Learning

Download submissions or view in LMS

Create grading rubrics

Student Workflow

Develop Solutions

Write MATLAB solutions in the browser
Use MATLAB desktop to develop solutions

Test and Submit

Submit solutions for assessment

Get instant feedback from test suites

Refine Solutions

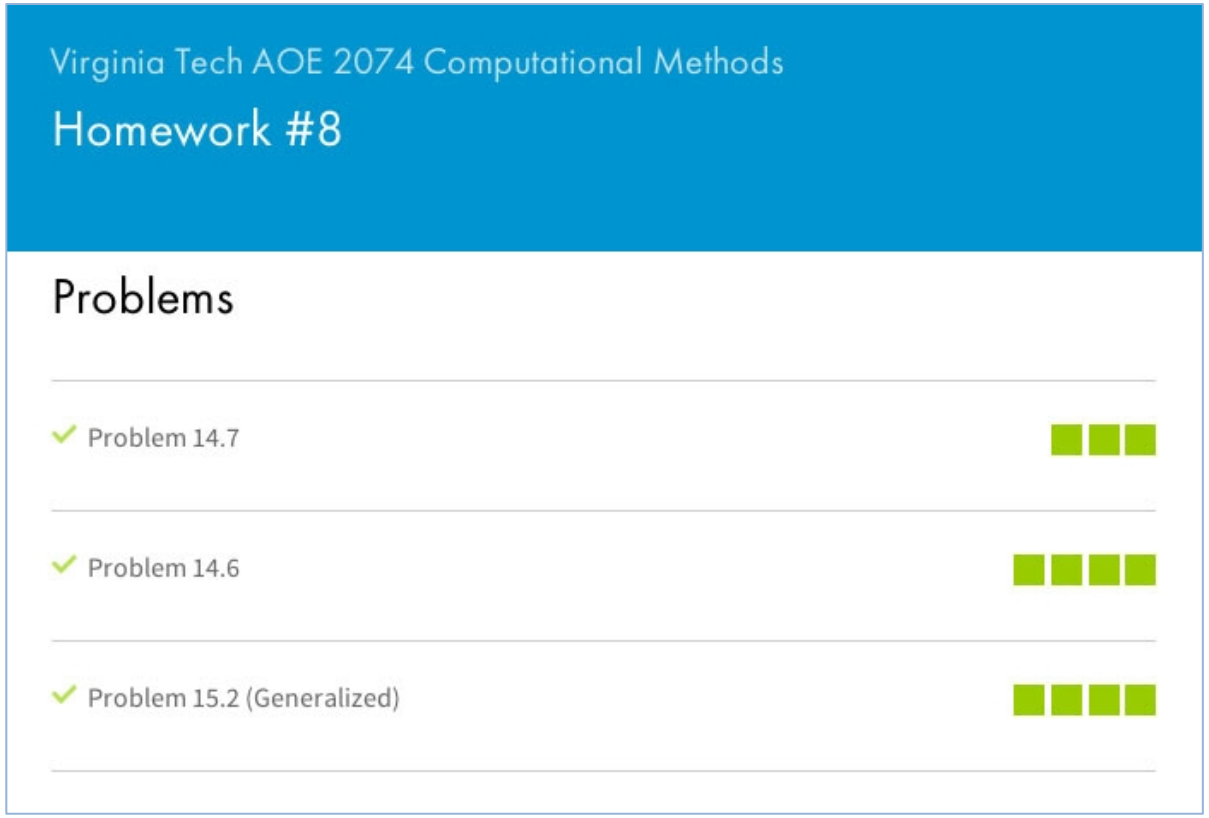
Use Solution Map to write better code

Compare solutions to peers

User Stories

Teaching Computational Methods to Second-Year Engineering Students at Virginia Tech

By Dr. Robert A. Canfield, Virginia Tech



"The approach enables students to learn more quickly from their mistakes on their own.

The move to MATLAB Grader (Cody Coursework) has proven to be beneficial from a teaching perspective, and student feedback has been positive."

- Dr. Canfield, Virginia Tech

"I live for green check marks."

- Student at Virginia Tech

User Quotes

"I want to use this in all of my courses that involve MATLAB."

- *Peter Corke, Queensland University of Technology (Robotics Professor & Blackboard LMS user)*

"the lab time required was reduced by more than 50% because the students knew what to expect…"

- *Angelique Janse van Rensburg, Professor, North-West University (Linear Systems course)*

Teaching and Learning Resources

Deans
Faculty

"I want graduate students to learn MATLAB for research."

Instructors
TAs

"I want students to know basic MATLAB & Simulink before they come to my class."

"I am spending way too much time writing and grading programming assignments."

"I can't engage my students with a static textbook. I need something interactive."

Deans
Admins

"I want students to graduate with proof of mastery of MATLAB skills."

Self-Paced Online Courses

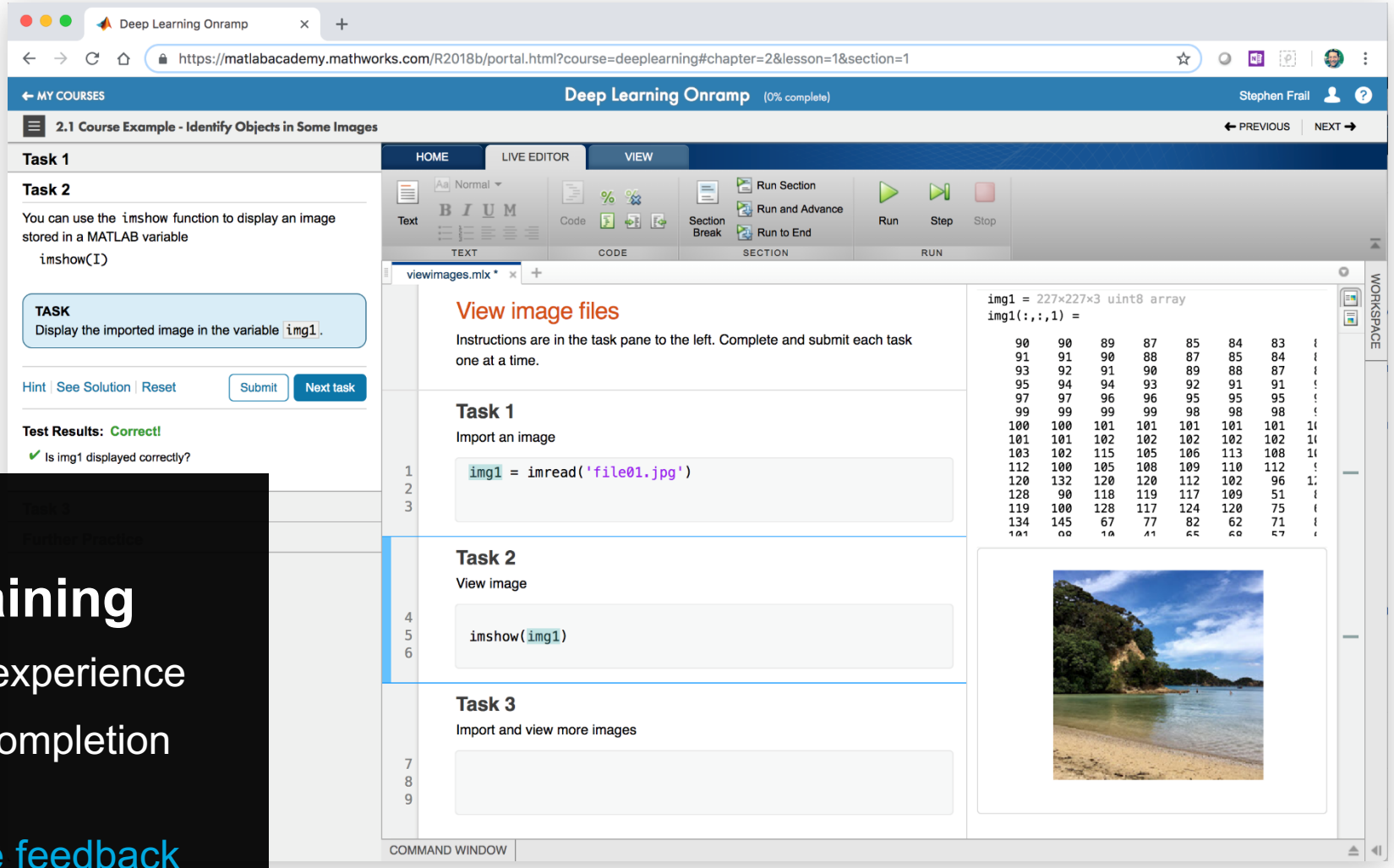
Onramps and Comp Math Courses

MATLAB Grader and MATLAB Courseware

Interactive Publisher Content / Books

Certification

Self-Paced, Online Training for MATLAB & Simulink



Campus-Wide Online Training

- Hands-on MATLAB and Simulink experience
- Measurable progress report and completion certificate
- Interactive lessons with immediate feedback
- 24/7 availability

Self-Paced Online Courses

Get Started

MATLAB Onramp

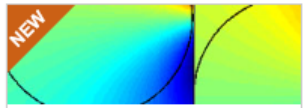
Deep Learning Onramp

Simulink Onramp

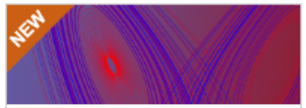
5 free courses – available for everyone
+ Machine Learning Onramp
+ Stateflow Onramp

Computational Mathematics

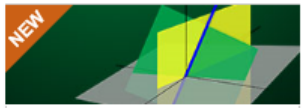
*Available only to users at universities that offer campus-wide online training access.



Solving Nonlinear Equations with MATLAB



Solving Ordinary Differential Equations with MATLAB



Introduction to Linear Algebra with MATLAB

Introduction to Statistical Methods with MATLAB

4 courses targeting MATLAB skills needed in the classroom

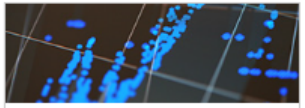
Core MATLAB Functionality

MATLAB Fundamentals

MATLAB Programming Techniques

MATLAB for Financial Applications

Data Analytics



MATLAB for Data Processing and Visualization

Machine Learning with MATLAB

Deep Learning with MATLAB

6 in-depth courses for enhancing MATLAB skills

MATLAB and Simulink Based Books

MATLAB® and Simulink® examples

Simulink® examples

- More than 2000 titles in 26 languages for educational and professional use
- Subjects include:
  - Biosciences and Biomedical
  - Chemistry and Chemical Engineering
  - Control Systems
  - Digital Signal Processing
  - Earth Sciences
  - Economics and Computational Finance
  - Image and Video Processing
  - Mathematics
  - Mechanical Engineering
  - Neural Networks and Fuzzy Logic
  - Physics
  - Programming and Computer Science
  - Robotics
  - System Modeling and Simulation

Teach with MATLAB Live Editor

MATLAB in an Executable Notebook

Use live scripts to create engaging lectures that combine explanatory text, mathematical equations, code and results

Share live scripts directly with colleagues or students

Work in a single environment to eliminate context switching

MATLAB Courseware

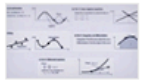
Downloadable sets of curriculum materials for educators based on MATLAB and Simulink.

- Video lectures
- Classroom materials
- Textbook references
- Homework assignments
- MATLAB and Simulink code examples

Topics Include:

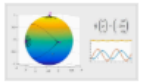
- Introduction to Programming
- Introduction to Engineering
- Bioengineering and Biological Sciences
- Chemistry
- Earth, Ocean and Atmospheric Sciences
- Economics and Finance
- Electrical and Computer Engineering
- Mechanical and Aerospace Engineering
- Mathematics
- Physics and Astronomy

Mathematics



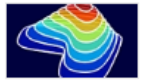
Applied Numerical Methods with MATLAB

Professor Steven C. Chapra
Tufts University



Differential Equations and Linear Algebra

Professor Gilbert Strang
Massachusetts Institute of Technology
Cleve Moler
MathWorks



Numerical Computing with MATLAB

Cleve Moler
MathWorks

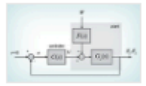
Teaching Calculus with MATLAB

Integrating MATLAB into a Calculus Curriculum

Electrical and Computer Engineering

Control of Mobile Robots

Professor Magnus Egerstedt
J.P. de la Croix
Georgia Institute of Technology



Control Tutorials for MATLAB and Simulink

Professor Bill Messner
Professor Dawn Tilbury
Professor Rick Hill

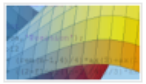
Introduction to Model-Based System Design

Professor Marc Herniter
Professor Zachariah Chambers
Rose-Hulman Institute of Technology

Advanced Model-Based System Design

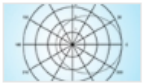
Professor Zachariah Chambers
Professor Marc Herniter
Rose-Hulman Institute of Technology

Introduction to Programming



Introduction to MATLAB Programming

Professor Kathleen Ossman
Professor Gregory Bucks
University of Cincinnati



Introduction to MATLAB

Professor William J. Palm, III
University of Rhode Island

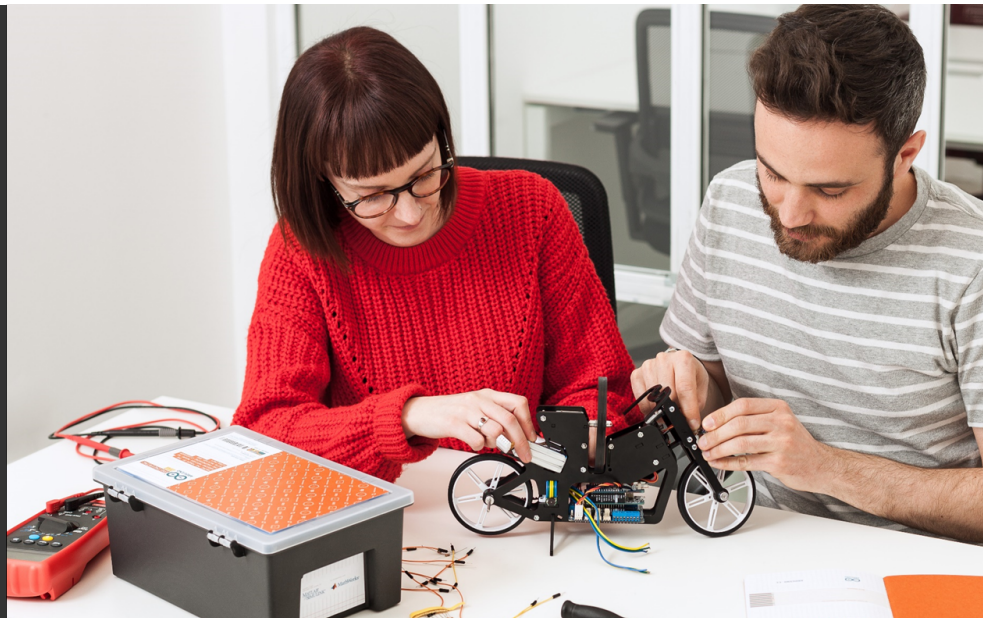
Low-Cost Hardware Curriculum Support for MATLAB

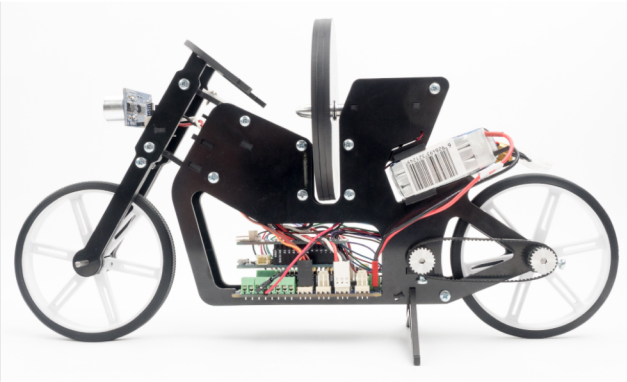
Arduino Engineering Kit

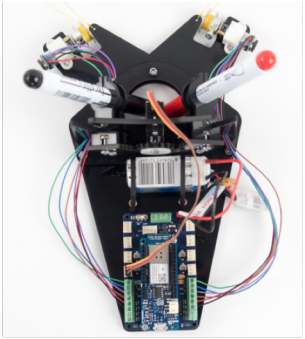
Includes Arduino MKR1000 board and all components to create three engaging, hands-on projects:

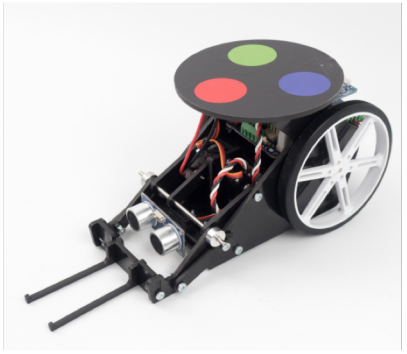
- self-balancing motorcycle
- mobile rover
- drawing robot

Online learning materials that facilitate project-based learning



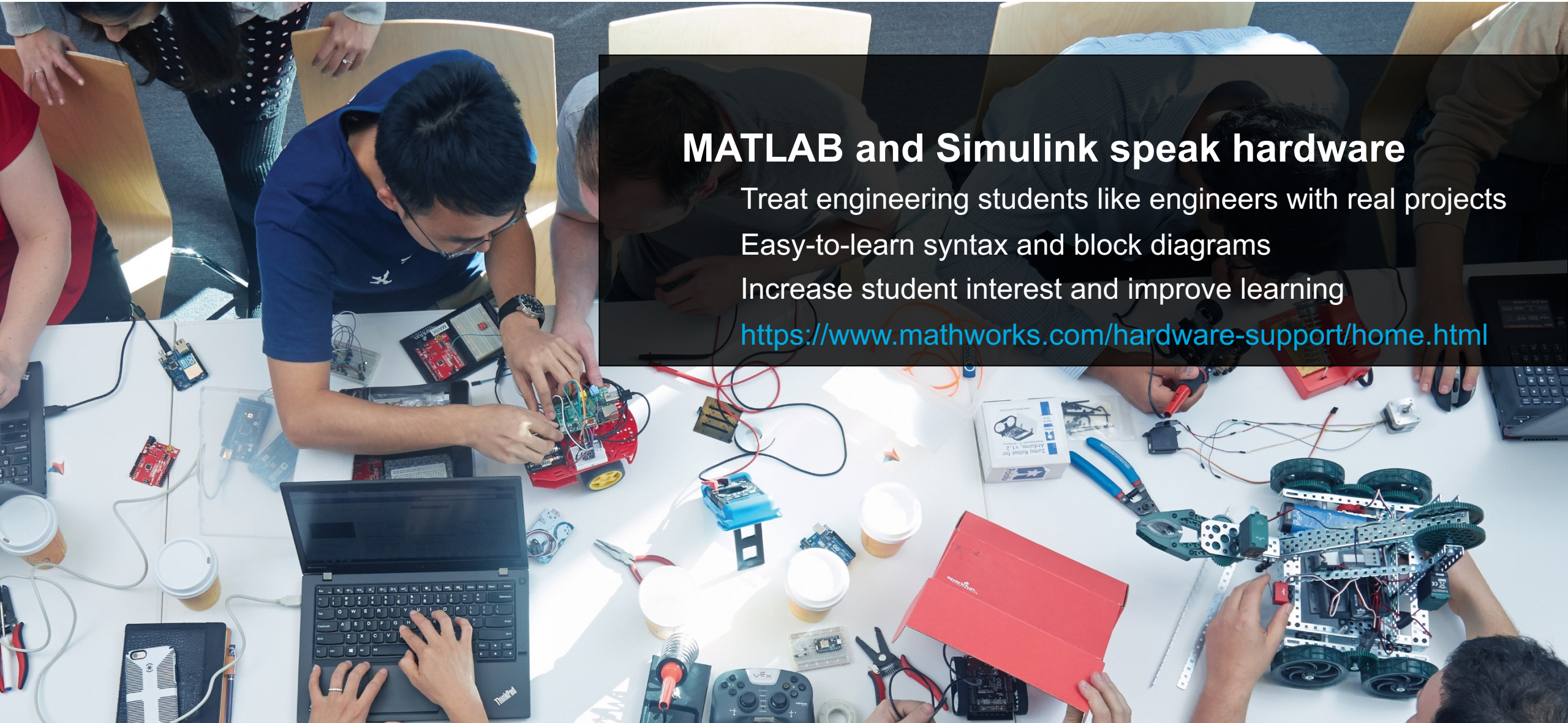






ARDUINO ENGINEERING KIT

Project-Based Learning with Low-Cost Hardware



MATLAB and Simulink speak hardware

Treat engineering students like engineers with real projects

Easy-to-learn syntax and block diagrams

Increase student interest and improve learning

https://www.mathworks.com/hardware-support/home.html

Get started on MATLAB Grader **for free** today!

https://grader.mathworks.com/

For more information about Teaching and Learning with MATLAB and Simulink:

https://www.mathworks.com/academia.html

Q&A