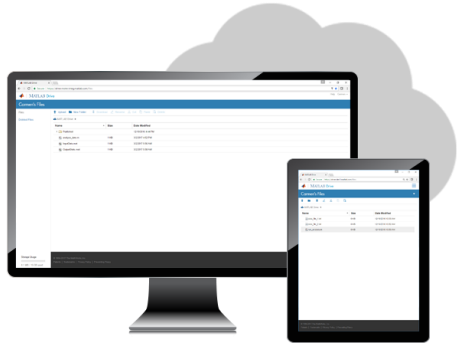
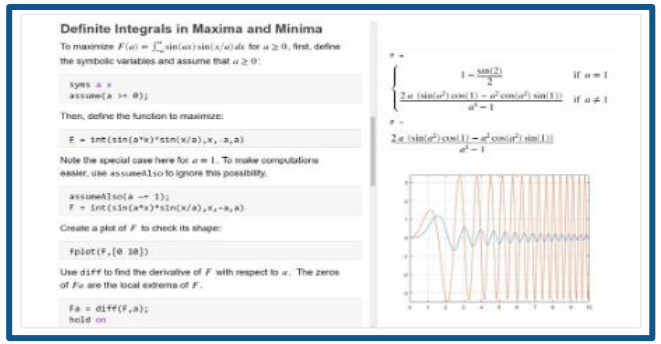
Online Learning and Virtual Labs with MATLAB and Simulink

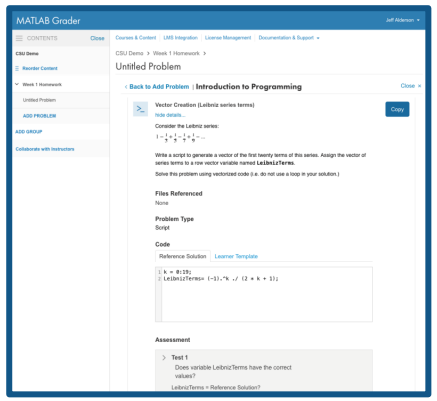
Online course example



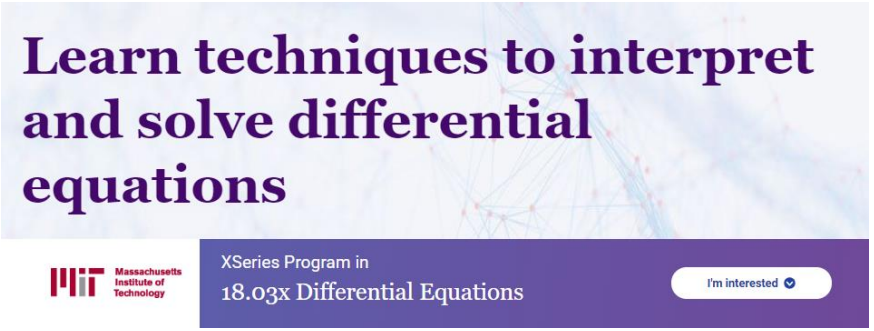
MATLAB Online



Live Scripts



MATLAB Grader



Learner Testimonials

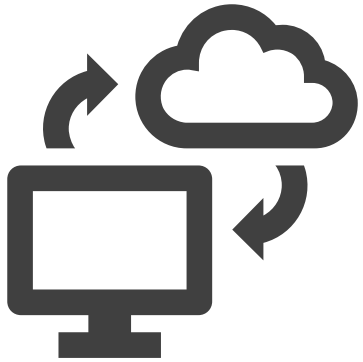
"Wonderful course on differential equations. The teachers provide a nice computational tool to depict the dynamics of solving the equations, which is very useful for students to grasp the key ideas and concepts." - Jiting (completed this course, spending 10 hours a week on it and found the course difficulty to be medium)

"Interesting course. Lectures, homeworks and review exercises of any part are really well setup. One of the best MOOC on topic of differential equations." - Gaetano (completed this course, spending 4 hours a week on it and found the course difficulty to be medium)

"Another excellent course from MIT. The lecture videos are excellent and so are the exercises. This course also has MATLAB based exercises which is wonderful. The problem sets are excellent and so are the staff and the community teaching assistants who are always there to help any time." - Dna47a (completed this course, spending 8 hours a week on it and found the course difficulty to be medium)

Source: https://www.edx.org/xseries/mitx-18.03x-differential-equations

Virtual course design



Access

Instruction

Assessment

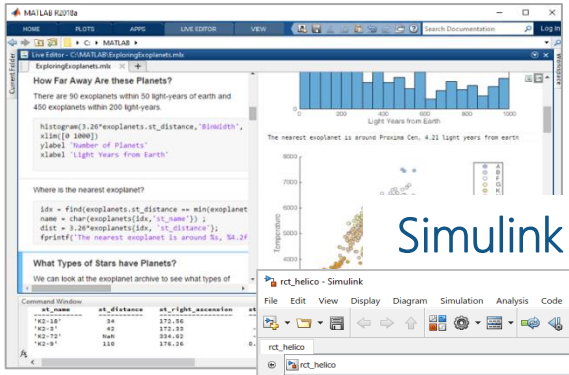
Getting Help

Our Products

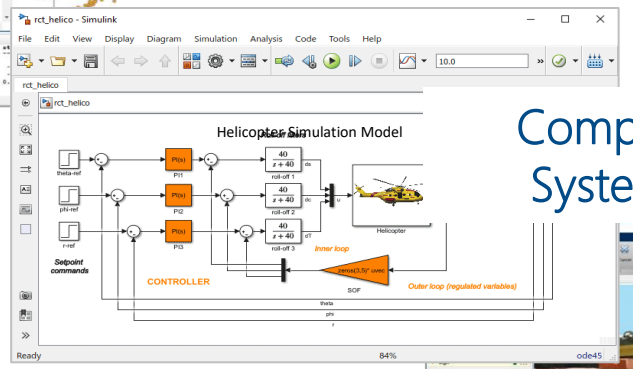
MATLAB® & SIMULINK®

- MATLAB is a programming environment for algorithm development, data analysis, visualization, and numeric computation.
- Simulink is a graphical environment for designing, simulating, and testing systems.
- 100 add-on products for specialized tasks.

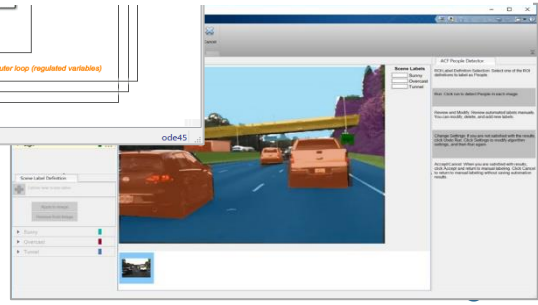
MATLAB

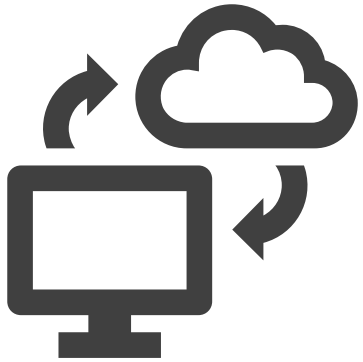


Simulink



Computer Vision System Toolbox





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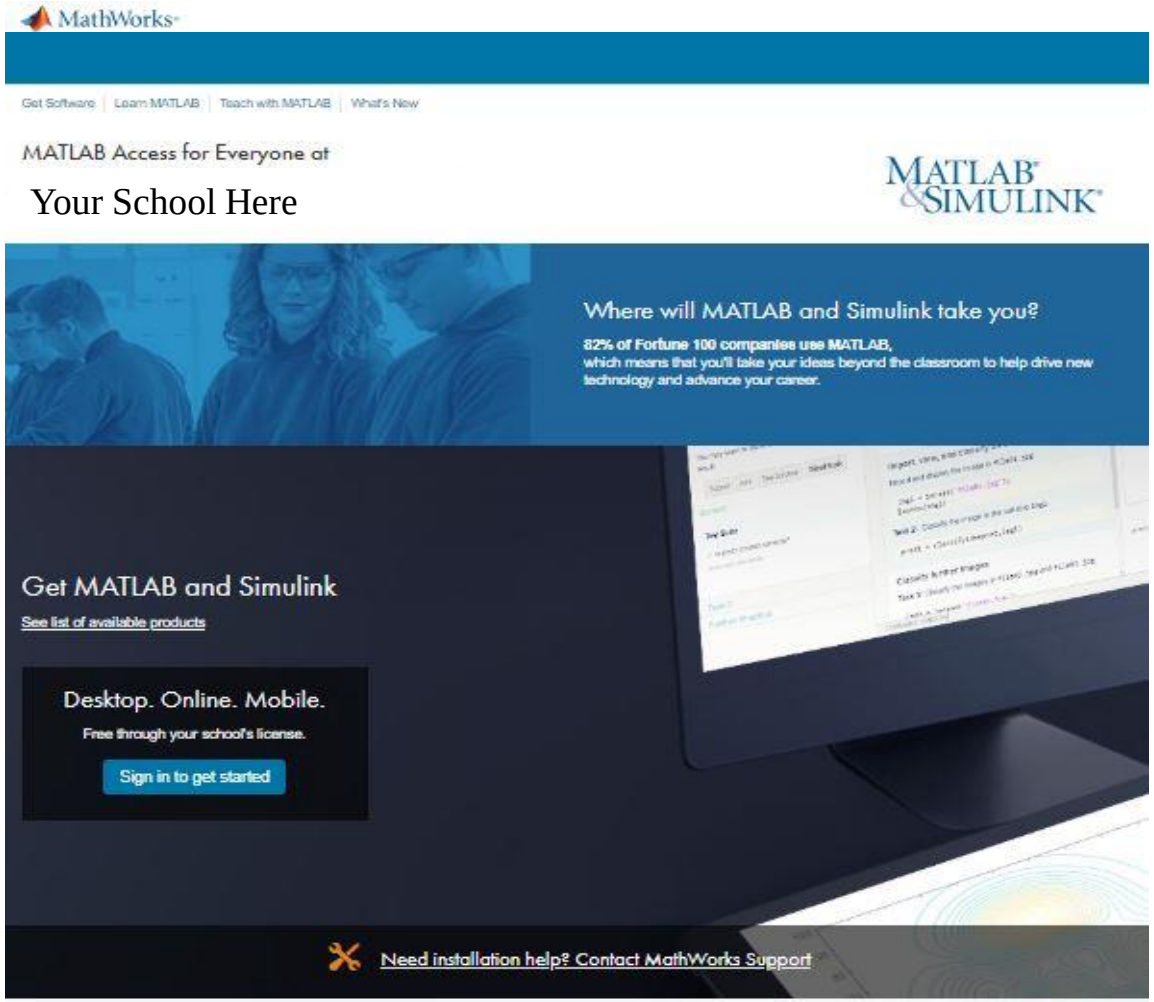
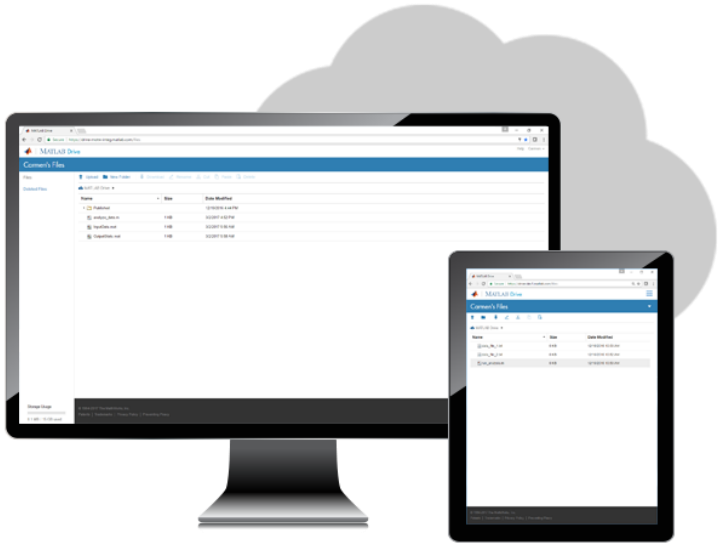
Campus-wide access



MATLAB Online



Simulink Online

MATLAB Drive

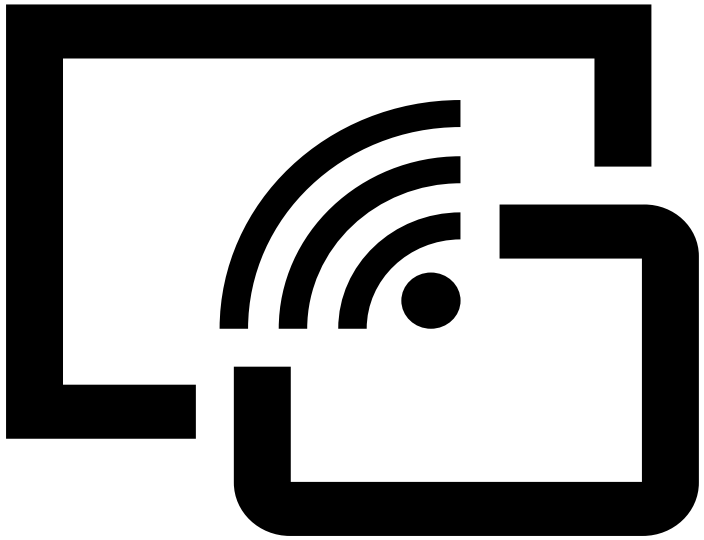
No download or installation required

Access to the latest version

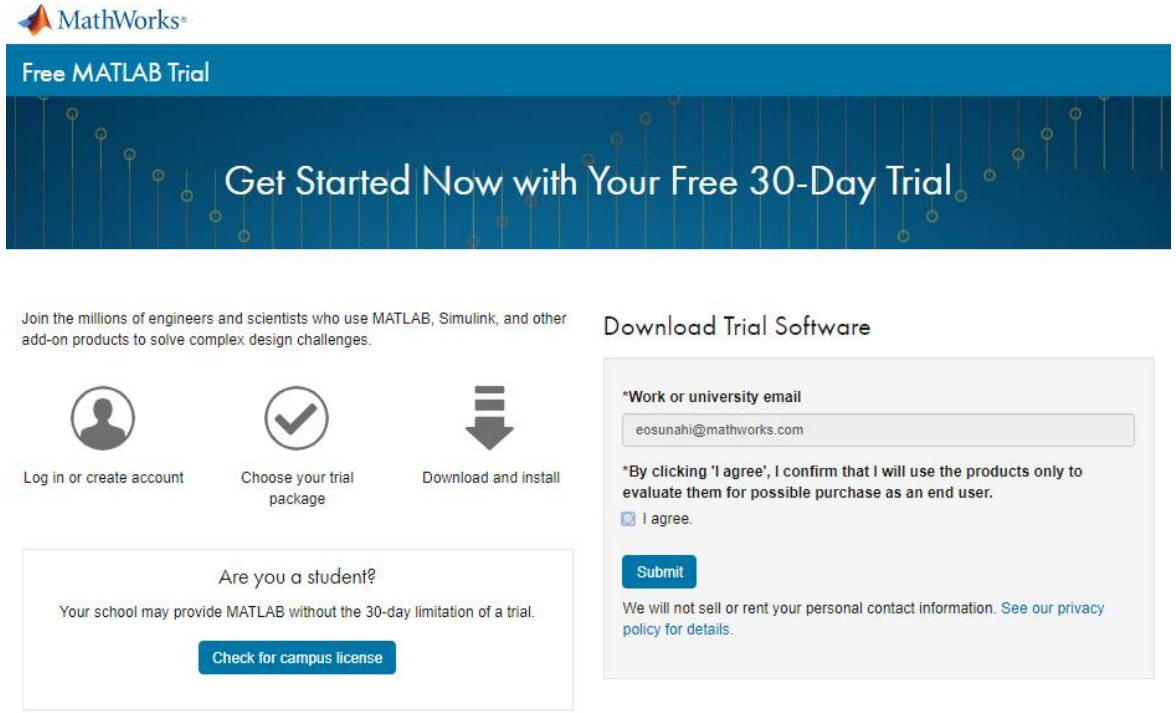
No minimum device specs other than that for your web browser

Access for universities without campus licenses

If available, access secure connection



For immediate needs, download 30 day trial



Access

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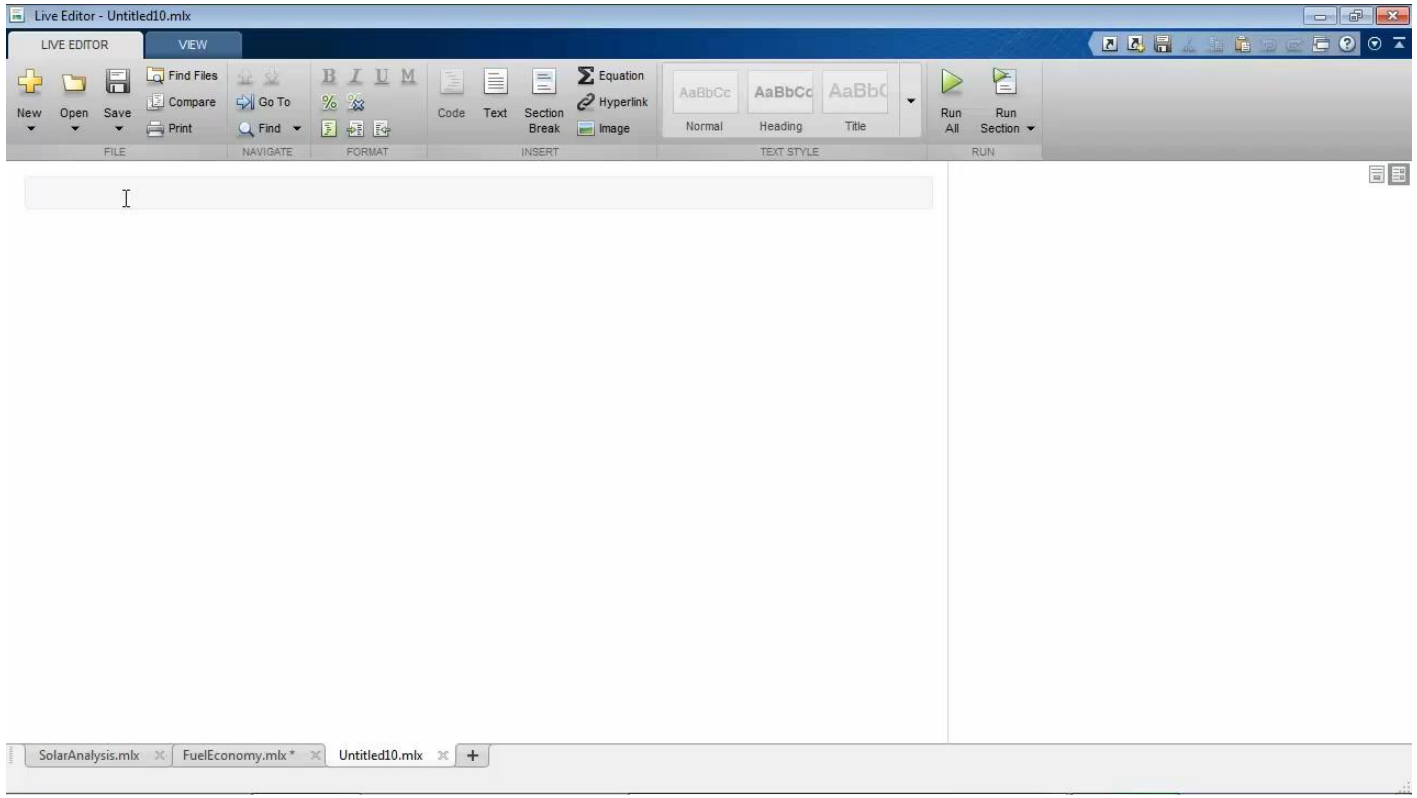
Getting Help

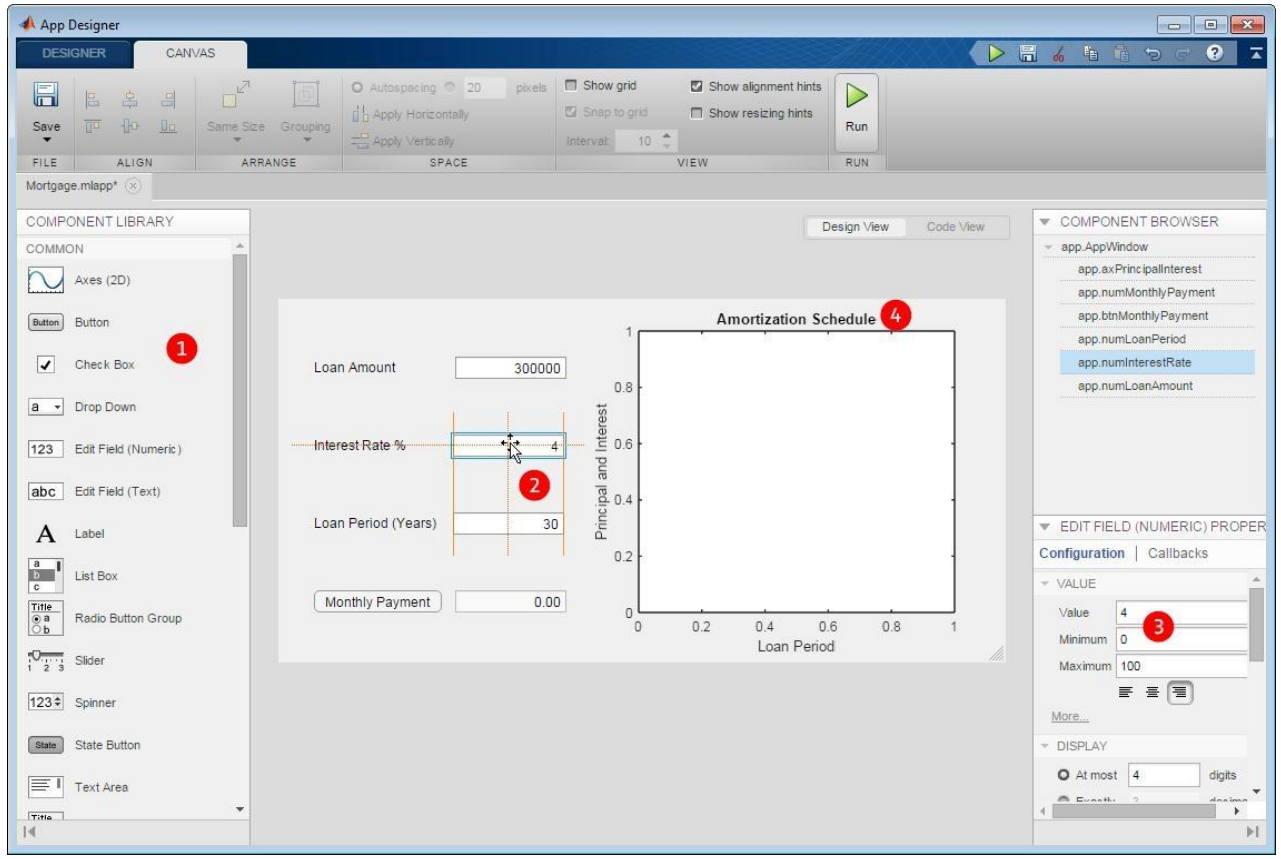
Interactive programming with Live Editor



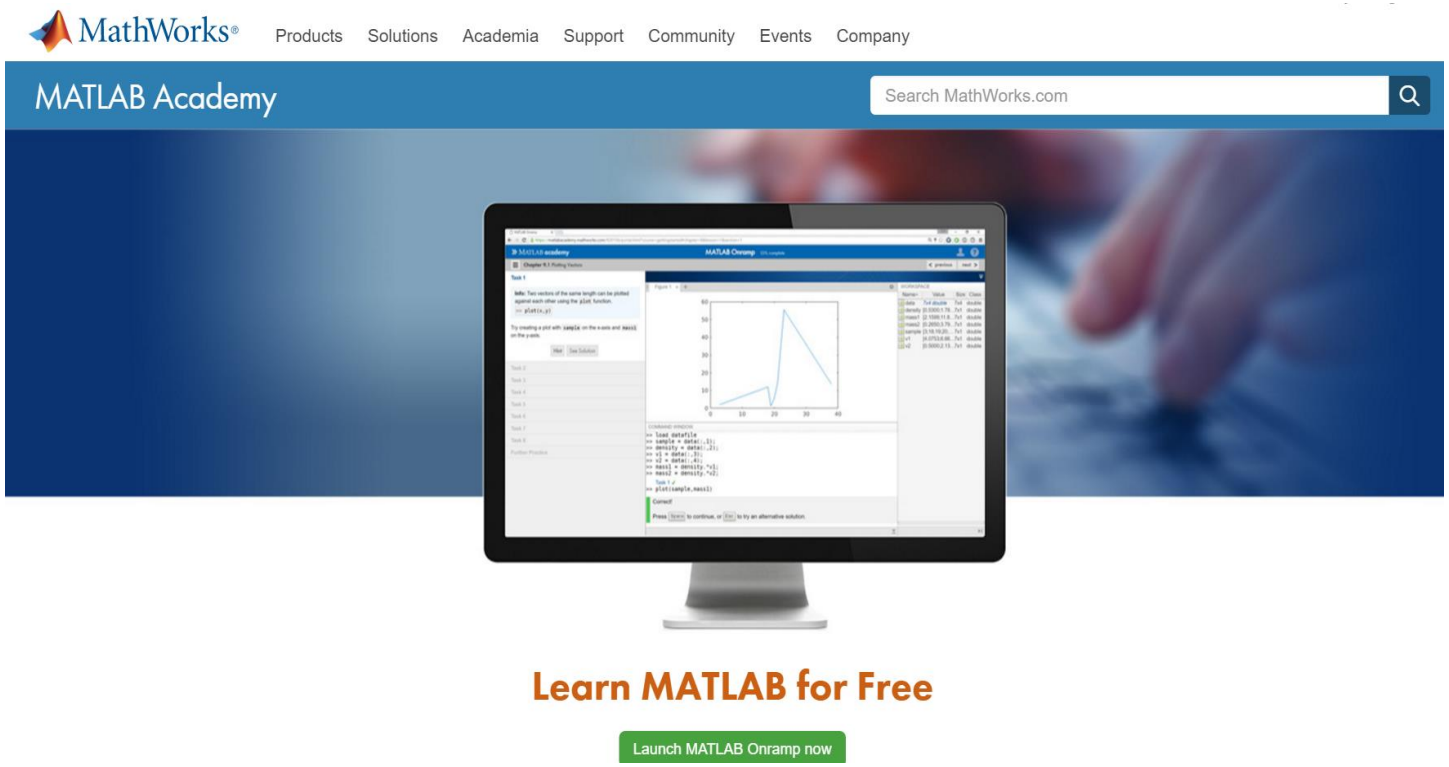
Features

- Teach with interactive documents
- Accelerate exploratory programming
- Create an interactive narrative
- Publish consistent reports

MATLAB App Designer



Self-paced courses



"The interactive MATLAB tutorials were perfect for engaging students and getting them up to speed quickly."

–Dr. Yu-li Wang, Carnegie Mellon University

FREE COURSES (2-3 hours)

MATLAB Onramp
Simulink Onramp
Stateflow Onramp
Image Processing Onramp
Machine Learning Onramp
Deep Learning Onramp
Signal Processing Onramp
Optimization Onramp
Circuit Simulation Onramp
Simscape Onramp
Reinforcement Learning Onramp
Wireless Communications Onramp
Control Design Onramp with Simulink

FOCUSED COURSES

FOUNDATIONAL COURSES (17-21 hours)

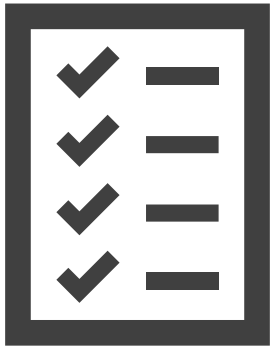
MATLAB Fundamentals
MATLAB Programming Techniques
MATLAB for Financial Applications
MATLAB for Data Processing and Viz
Machine Learning with MATLAB
Deep Learning with MATLAB

COMPUTATIONAL MATH COURSES (2-3 hours)

Introduction to Linear Algebra
Solving Ordinary Differential Equations
Introduction to Statistical Methods
Solving Non-Linear Equations
Introduction to Symbolic Math with MATLAB

Access

Instruction

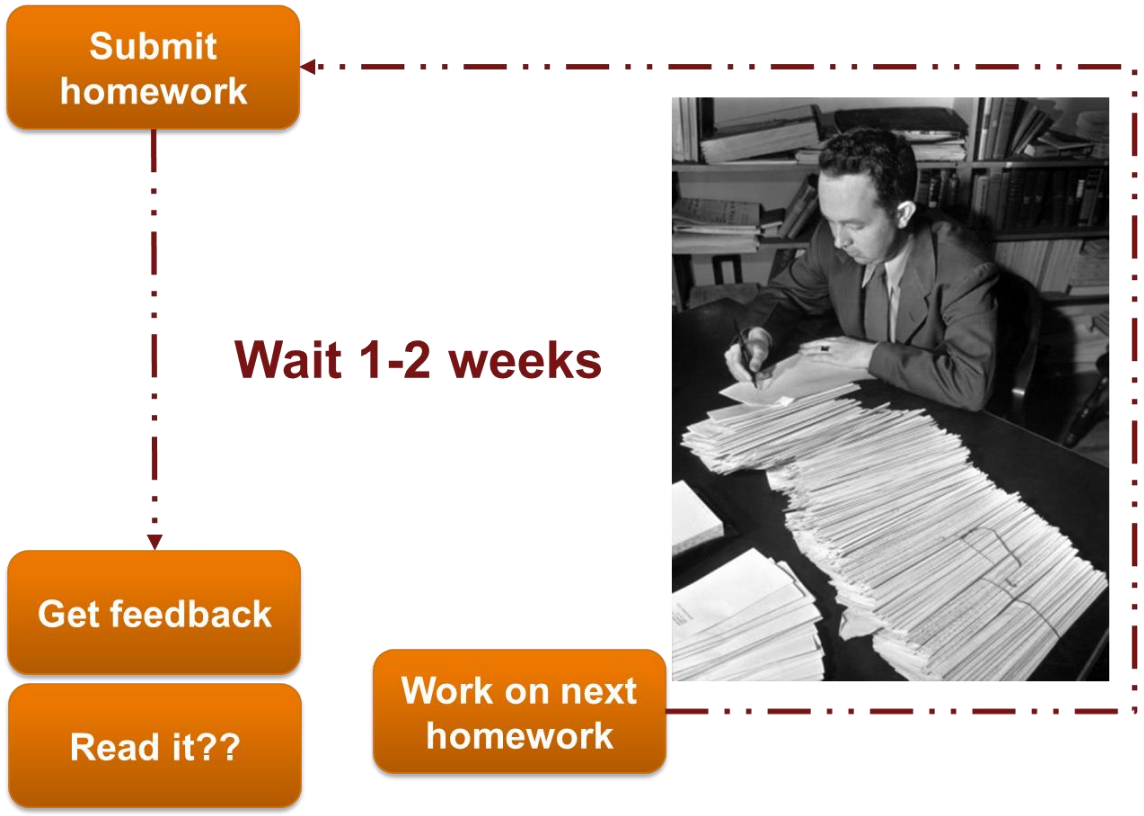


Assessment

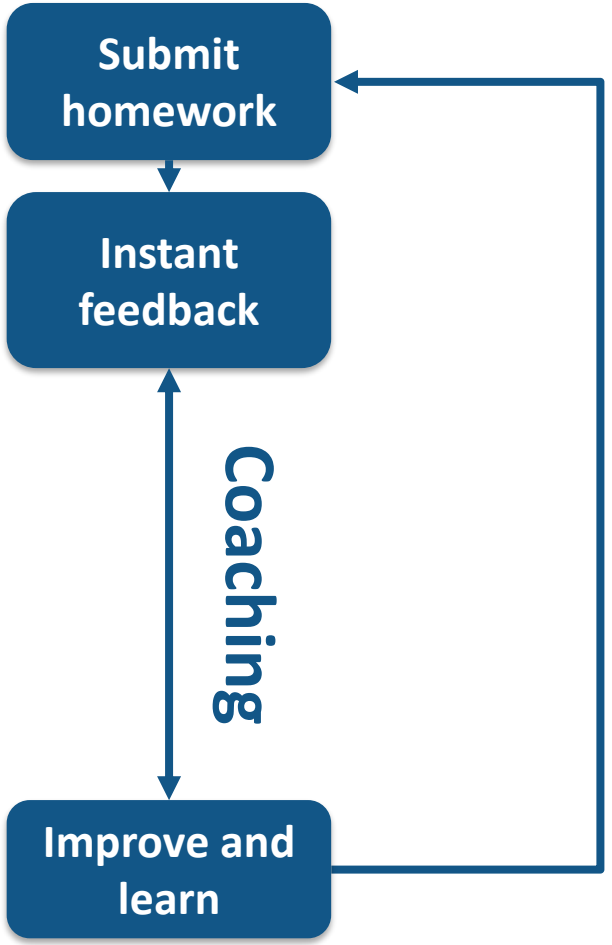
Getting Help

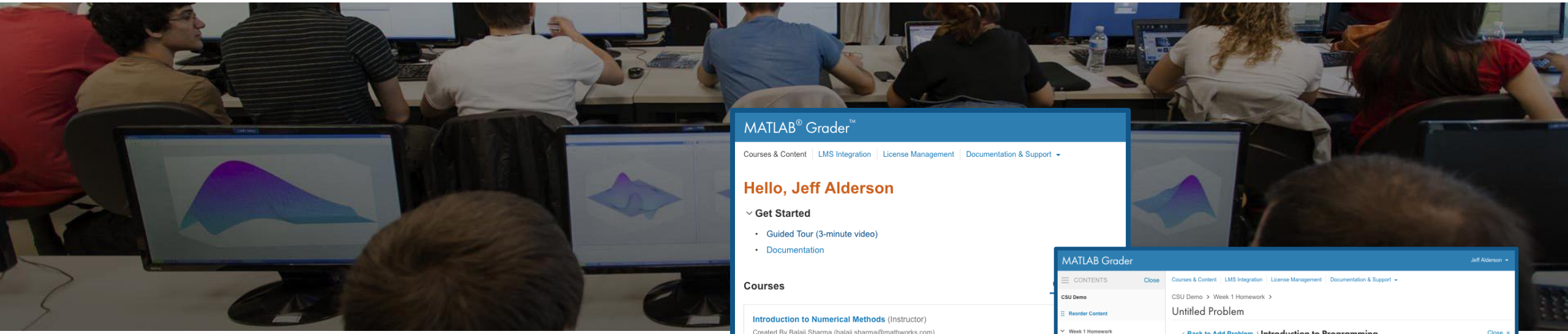
Autograde MATLAB Assignments

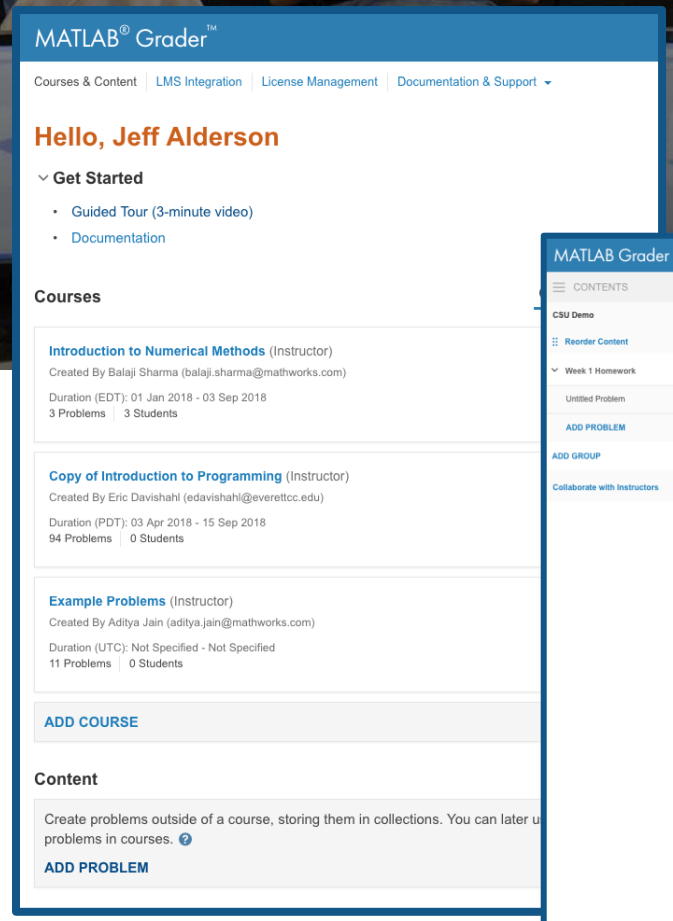
Traditional Grading

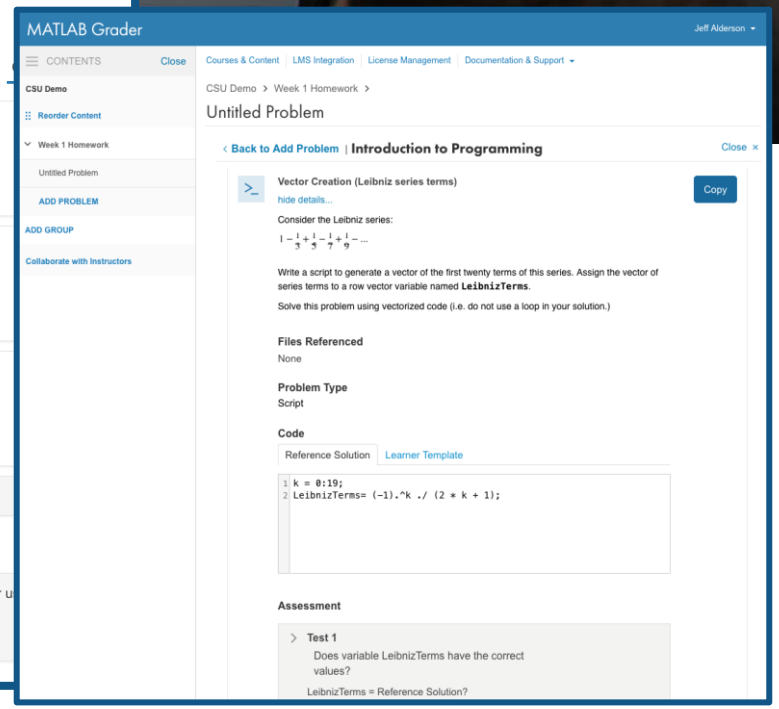


Autograding







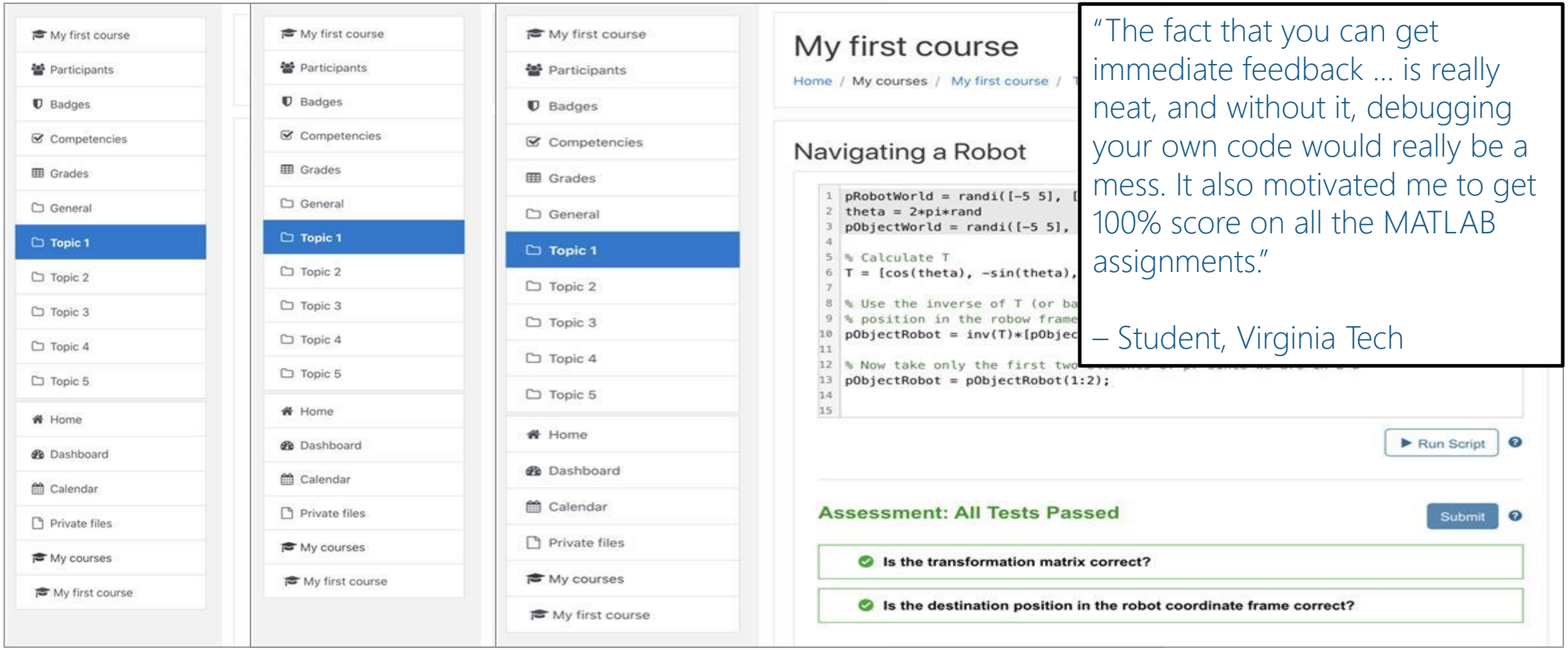


Create interactive course assignments

Automatically grade student work and provide feedback

Run your assignments in any learning environment

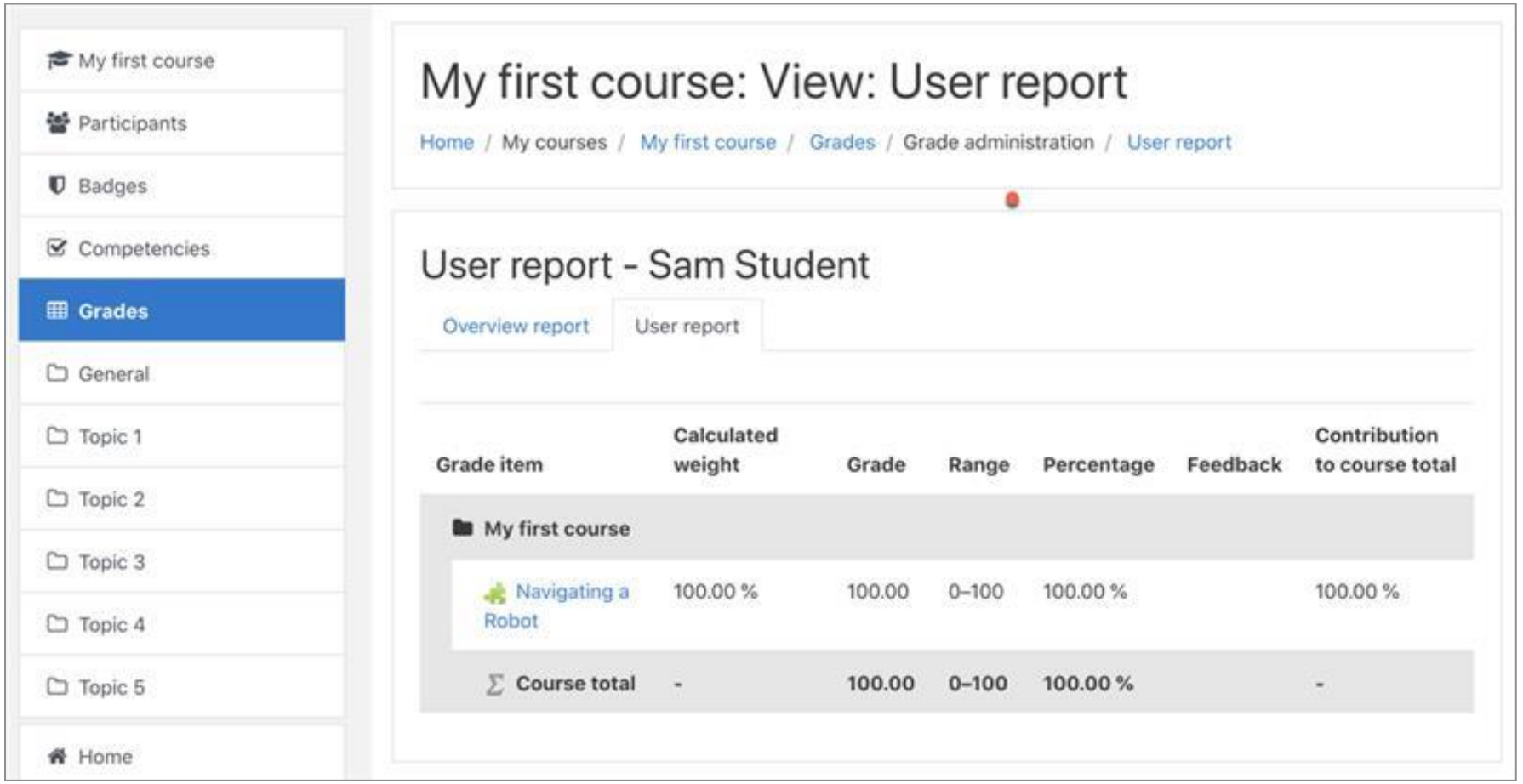
Student Experience



"The fact that you can get immediate feedback … is really neat, and without it, debugging your own code would really be a mess. It also motivated me to get 100% score on all the MATLAB assignments."

– Student, Virginia Tech

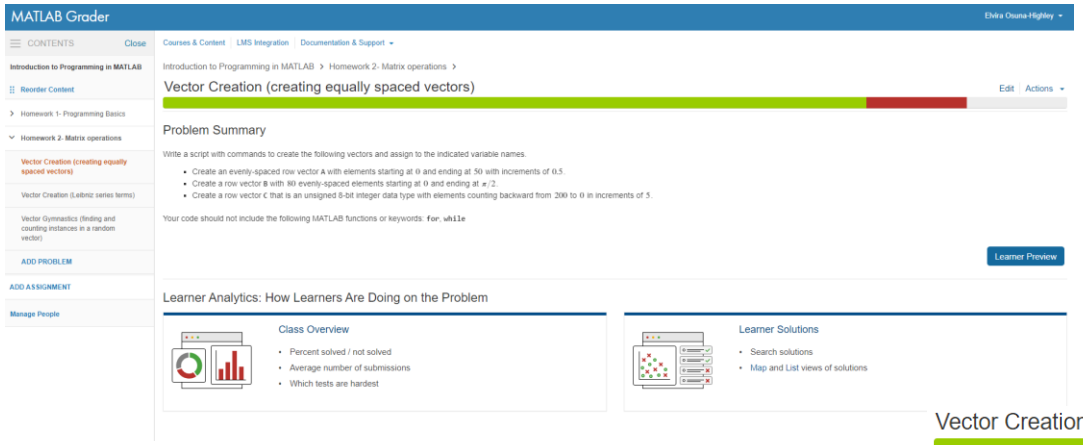
Grading and Learning Metrics

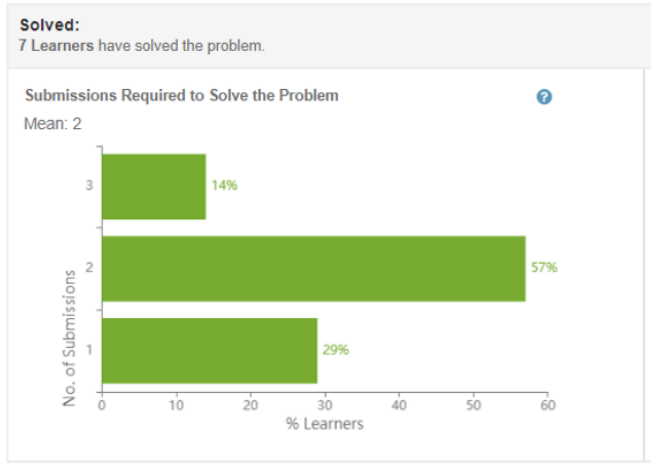


"The approach enables students to learn more quickly from their mistakes on their own."

– Dr. Bob Canfield, Virginia Tech

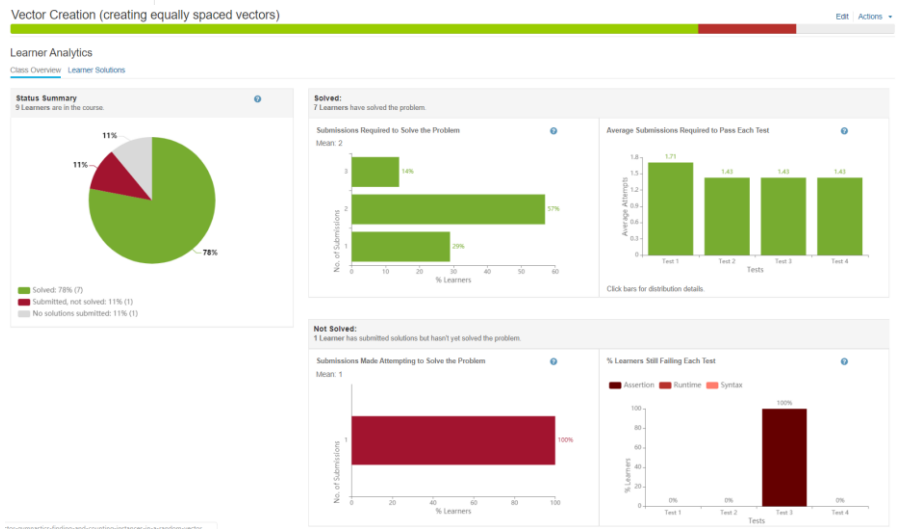
Grading and Learning Metrics

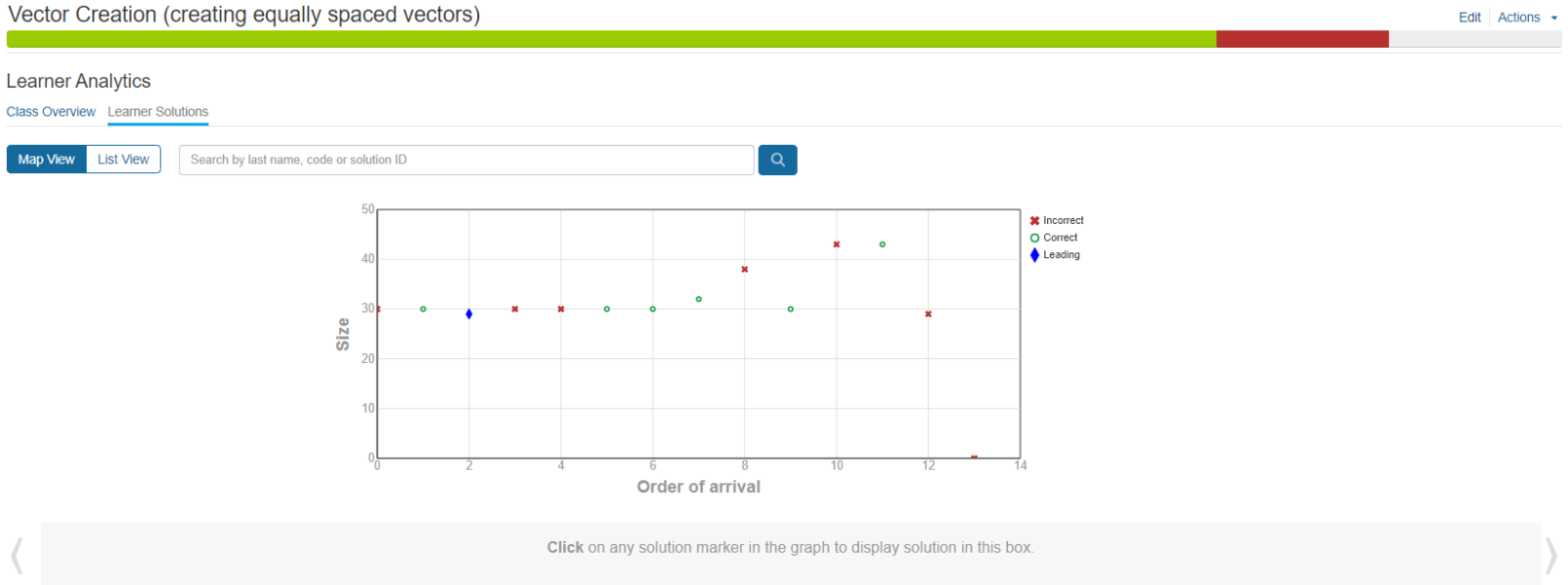




"With MATLAB Grader, students can learn at their own pace until they are satisfied, and I am noticing deeper understandings from my students."

- Dr. Masatide Abe
Tohoku University





Access

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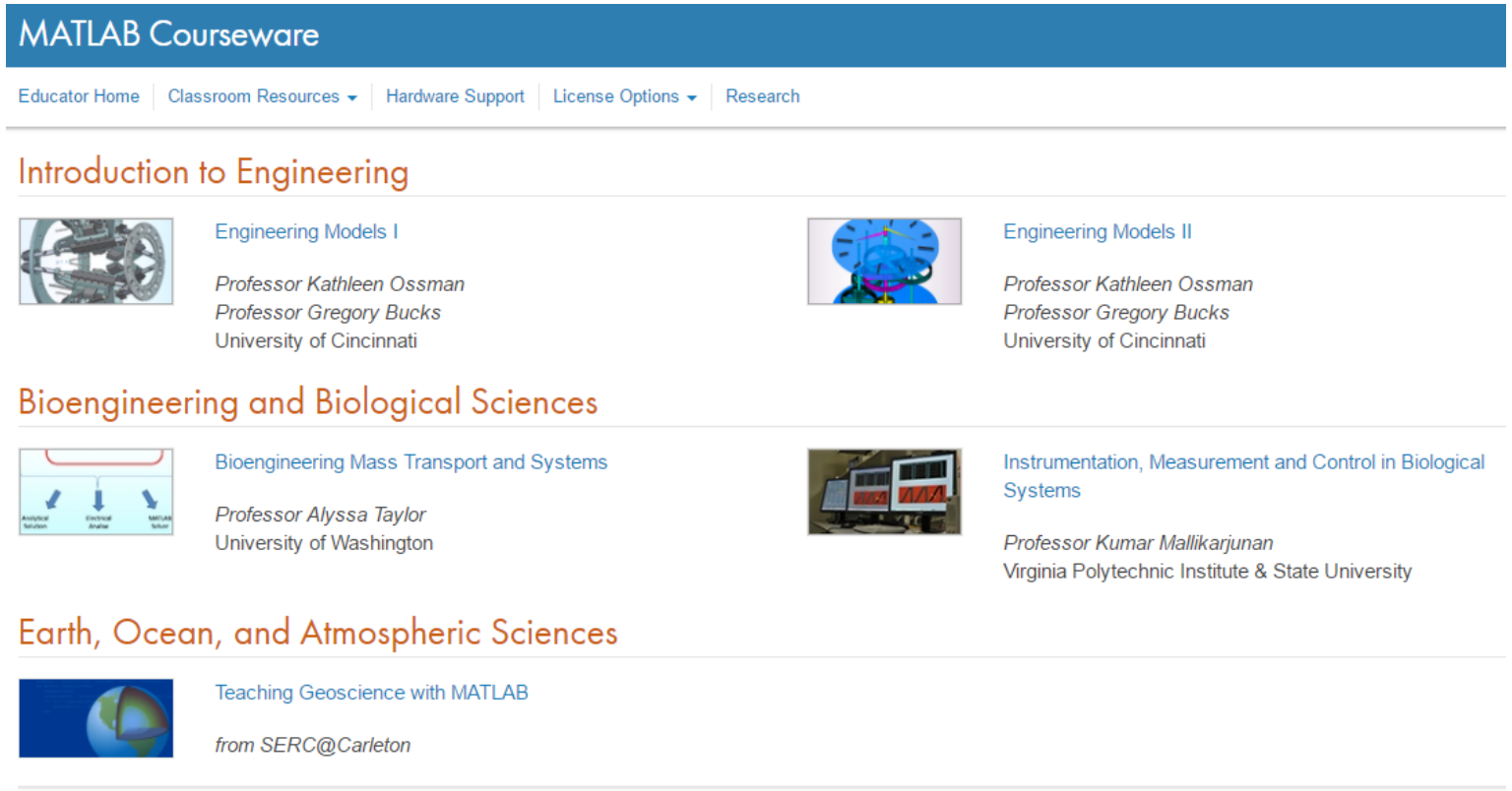
Getting Help

MATLAB Courseware

Teaching resources created by your peers

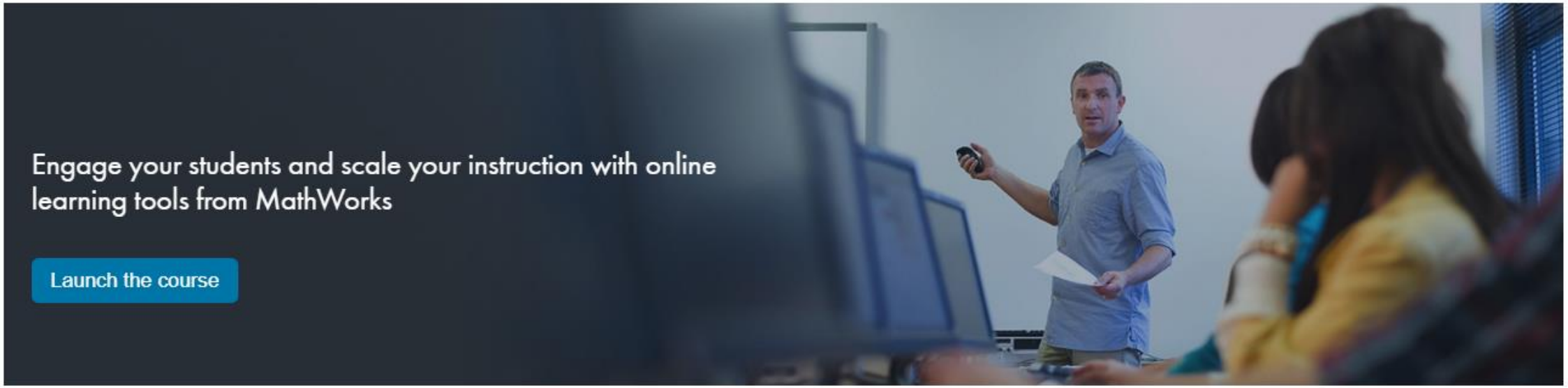


Teaching Kits for Free

Download content consisting of:

- Lecture Notes
- Project Ideas
- Accompanying Code

Training for Educators



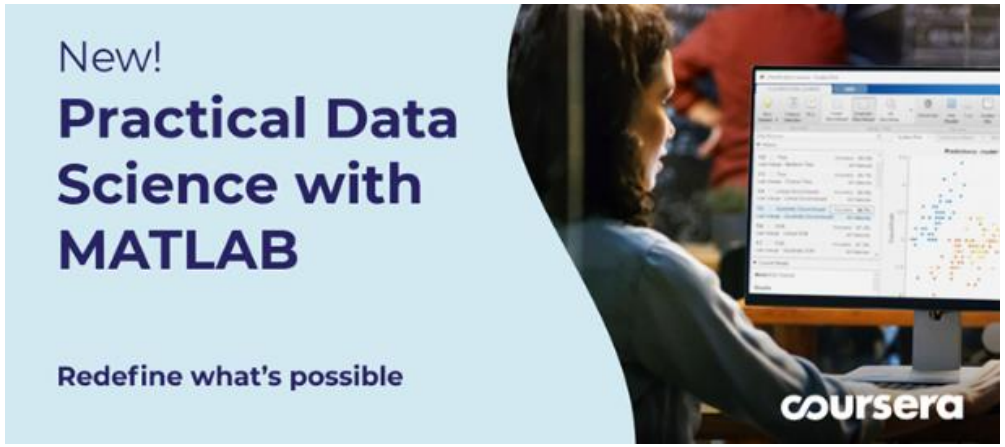
Access to MATLAB through your web browser

MATLAB integrated file sharing

Hands-on exercises with automated assessments and feedback

Ready-to-use resources to enhance your instruction

MathWorks MOOCs



Four courses (approx. 2 months to complete)

- Exploratory Data Analysis with MATLAB
- Data Processing and Feature Engineering with MATLAB
- Predictive Modeling and Machine Learning with MATLAB
- Data Science Project: MATLAB for the Real World

Free Online MATLAB course is a top MOOC

- Functions
- Linear Algebra
- Loops and Data Types
- File Input/Output

coursera.org/specializations/practical-data-science-matlab

MathWorks® Products Solutions Academia Support Community Events Get MATLAB

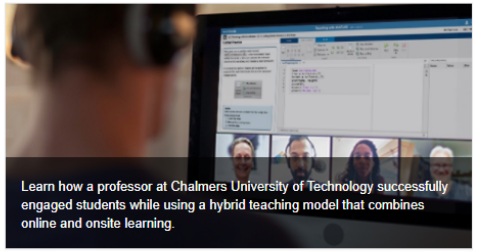
Educators

Search MathWorks.com

Teach with MATLAB and Simulink | Curriculum Resources | Online Teaching | Campus-Wide License

Online Teaching with MATLAB and Simulink

Whether you are transitioning a classroom course to a hybrid model, developing virtual labs, or launching a fully online program, MathWorks can help you foster active learning no matter where it takes place. Here you will find resources and ideas for providing hands-on experiences with MATLAB and Simulink, plus tools for delivering instruction, engaging students, and assessing outcomes.



Instructional Resources

Virtual Labs and Projects

Online Assessments

Create Engaging, Interactive Course Materials

Make your courses more interactive, promote self-directed learning, and increase student engagement through Live Editor and MATLAB apps.

Use MATLAB on the desktop or MATLAB Online to create live scripts. Share live scripts with students through your university's learning management system or using MATLAB Drive. Learn more about creating and sharing live scripts for applications such as flipped classrooms on the Instructional Resources page.

In addition, you can host and run a collection of MATLAB apps on your own MATLAB Web App Server at your university.

https://www.mathworks.com/academia/online-teaching.html

MathWorks® Products Solutions Academia Support Community Events

Distance Learning Community

Search Dis

MATLAB Central | Home | Explore | Contribute | My Activity

Keep Teaching through Distance Learning

Posted by Loren Shure, March 23, 2020

As many universities are moving quickly to distance learning, it is vital for educators to think carefully about how to adapt their approach to still deliver key learning outcomes for students in an online setting.

» Read more...

Discussions

Start a discussion

Welcome to the Distance Learning Community
Latest activity by jiro on 30 Mar 2020 at 13:17
Tags: distance_learning
0 replies

Tell us your story
Latest activity by jiro on 30 Mar 2020 at 13:05
Tags: distance_learning
0 replies

» View all discussions

www.mathworks.com/matlabcentral/topics/distance-learning.html

Next Steps Checklist

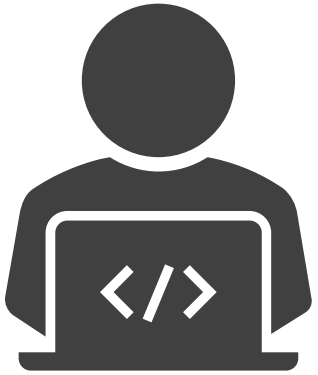
- ✓ Complete the Online Training for Educators
- ✓ Add MATLAB Onramp and/or Simulink Onramp to courses
- ✓ Convert coding examples to interactive Live Scripts
- ✓ Tell your LMS administrator to add MATLAB Grader to your LMS
- ✓ Virtualize your labs with MATLAB Mobile and ThingSpeak

Customer Success Engineers

consult with faculty and researchers to support them with their STEM initiatives, including integrating computational or systems thinking into their curriculum.

info@terasoft.com.tw

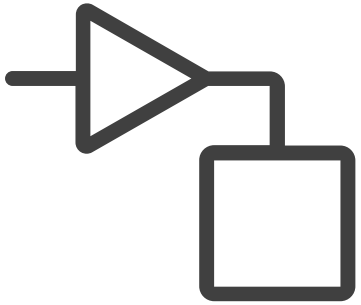
Learn by doing



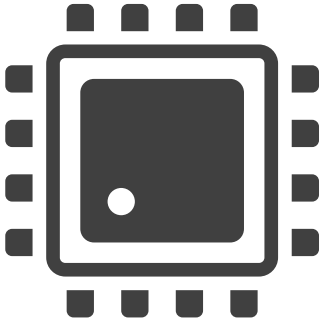
… and learn from mistakes

"Mistakes… are the portals of discovery."
–James Joyce

Laboratory Models



Virtual

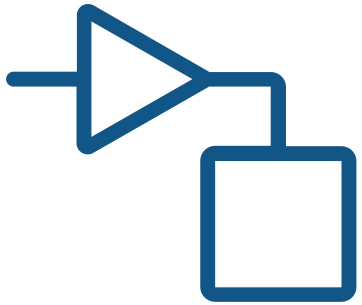


Hardware at Home

Remote

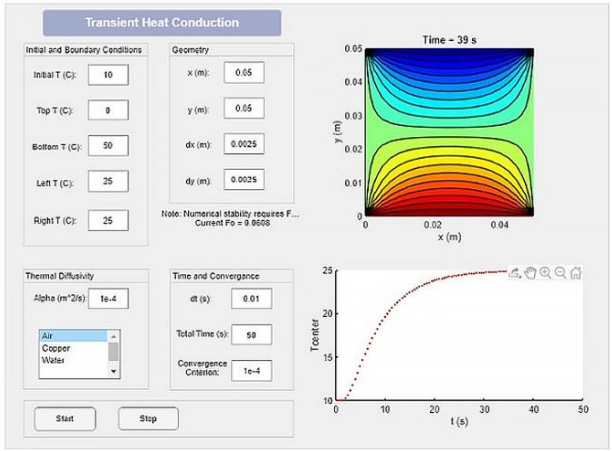
Complexity	High	Low	High
Interactivity	High	High	Low
Hands-On	Low	High	Low
Realism	Low	Low	High

Fully-Virtual Labs



Complexity
Interactivity

Realism
Hands-On



- Graphical Interface with Visualization
- Mathematical Model of Processes
- Equipment or Hardware Simulations

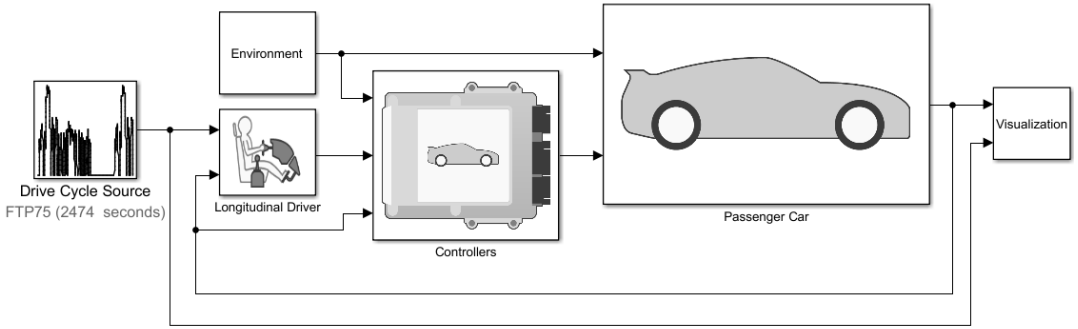
Challenges:

- Incorporating sufficient visuals
- Replacing the hands-on component
- May lose real-world factor

SIMULINK®

Simulation and Model-Based Design

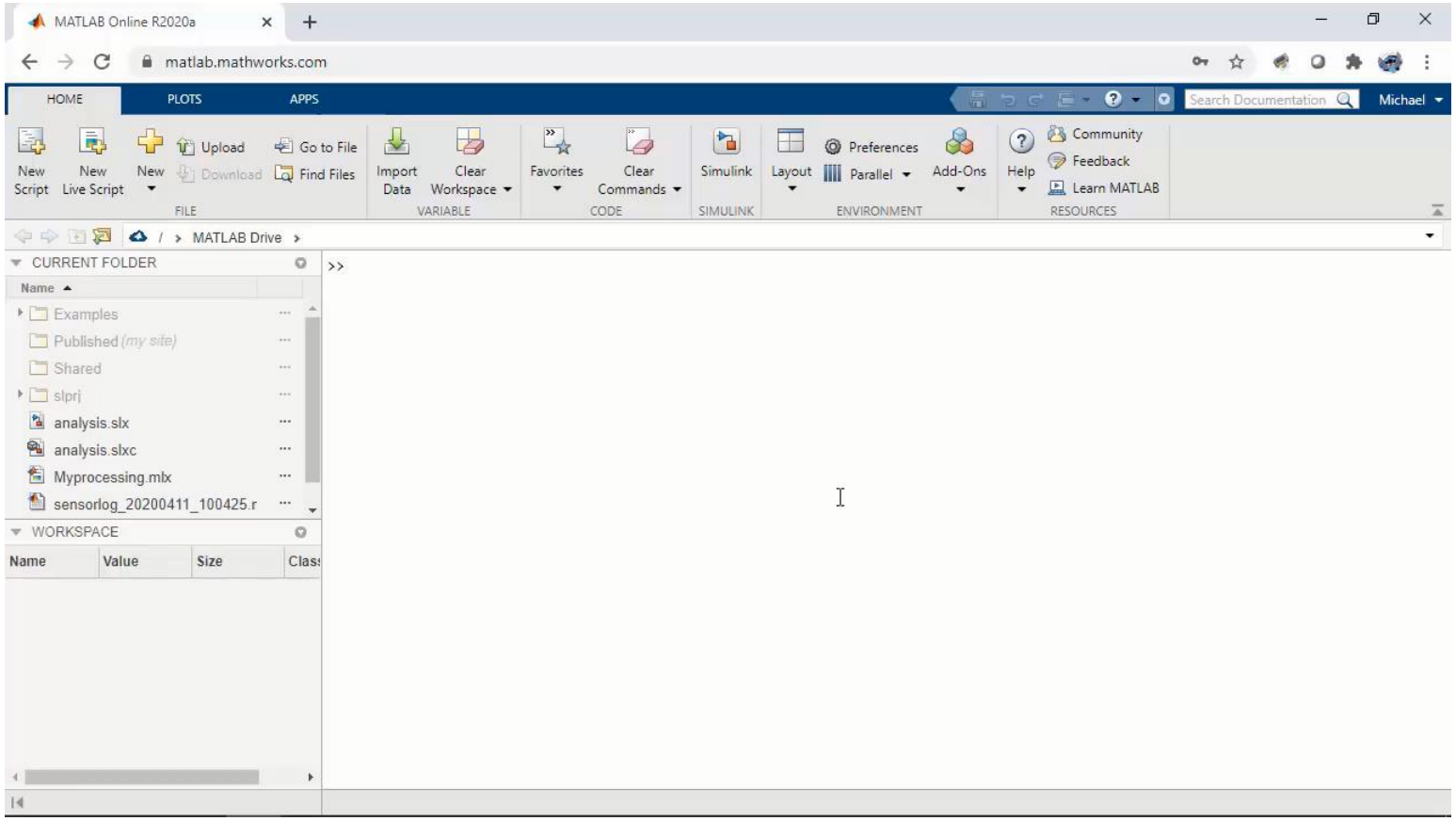
Virtual



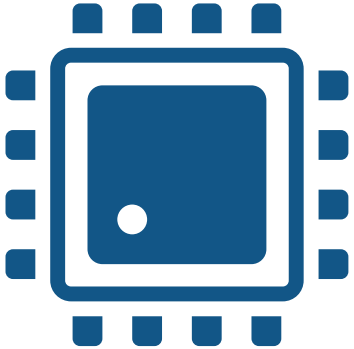
SIMULINK®

Virtual

Simulation and Model-Based Design

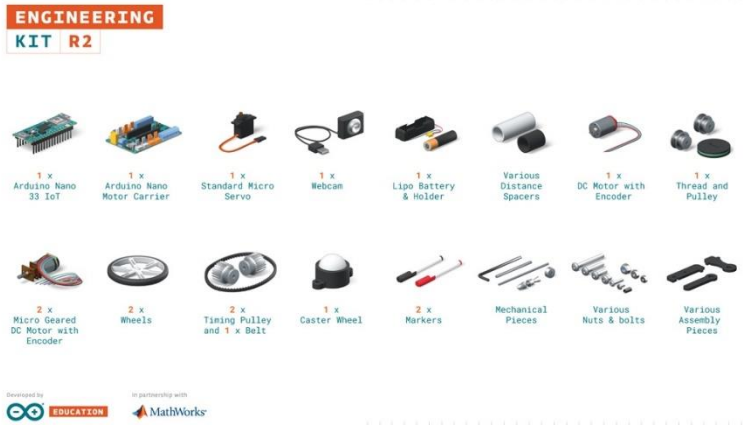


Hardware at Home Labs



Hands-On Interactivity

Realism Complexity



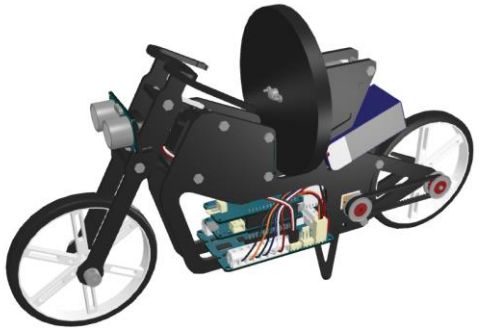
- Hardware Kits
- Data Collection with Sensors
- Mobile Devices

Challenges:

- Kit and hardware logistics
- Too simplistic
- Safety and oversight of students

Project-based learning with low-cost hardware

Hardware



Self-balancing robots using
Arduino

Edge Detection using
Raspberry Pi

"I really enjoyed, 'Edge AI with Raspberry Pi using MATLAB' to deploy face detection and age prediction algorithms on a Raspberry Pi. I have no experience in hardware, but I completed the tutorial and now have a strong curiosity."

-Katie Amrine, PhD
Decision Scientist, Facebook

MATLAB Mobile

Hardware

Remote-Access Labs

Realism
Complexity

Hands-On
Interactivity

ROBOTARIUM
by GeorgiaTech

- Remote Control of Equipment
- Live Stream from University Lab
- Internet of Things

Challenges:

- Students need more than watching
- Incorporating sufficient interactivity
- Replacing the hands-on component

ThingSpeak

IoT analytics platform

Remote

Collect

Send sensor data privately to the cloud.

Analyze

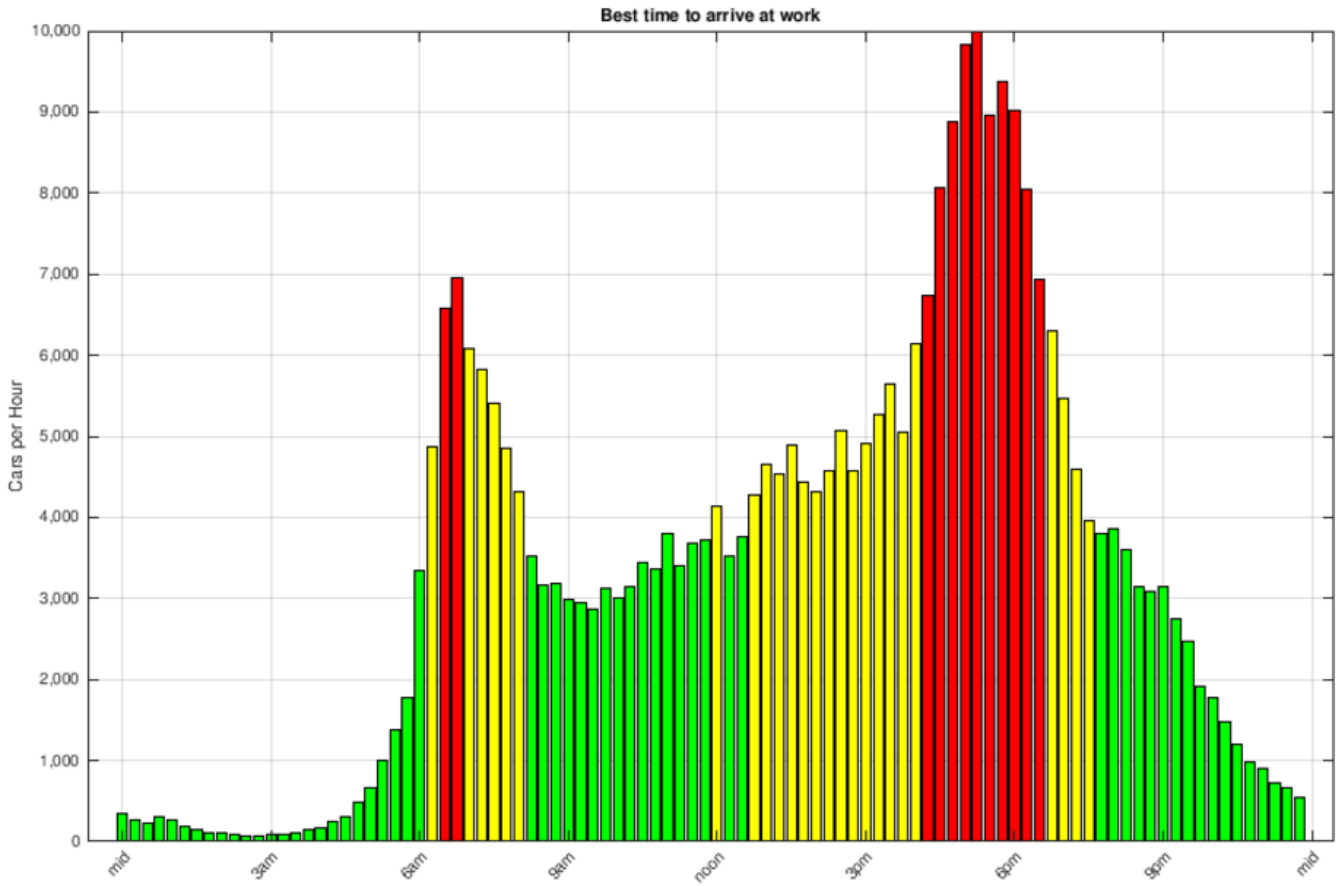
Analyze and visualize your data with MATLAB.

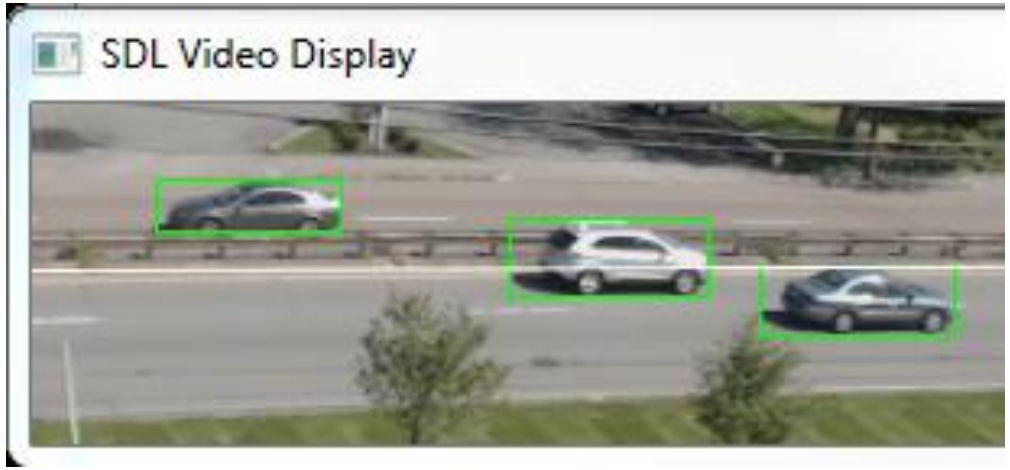
Act

Trigger a reaction.

Traffic Analysis

Remote

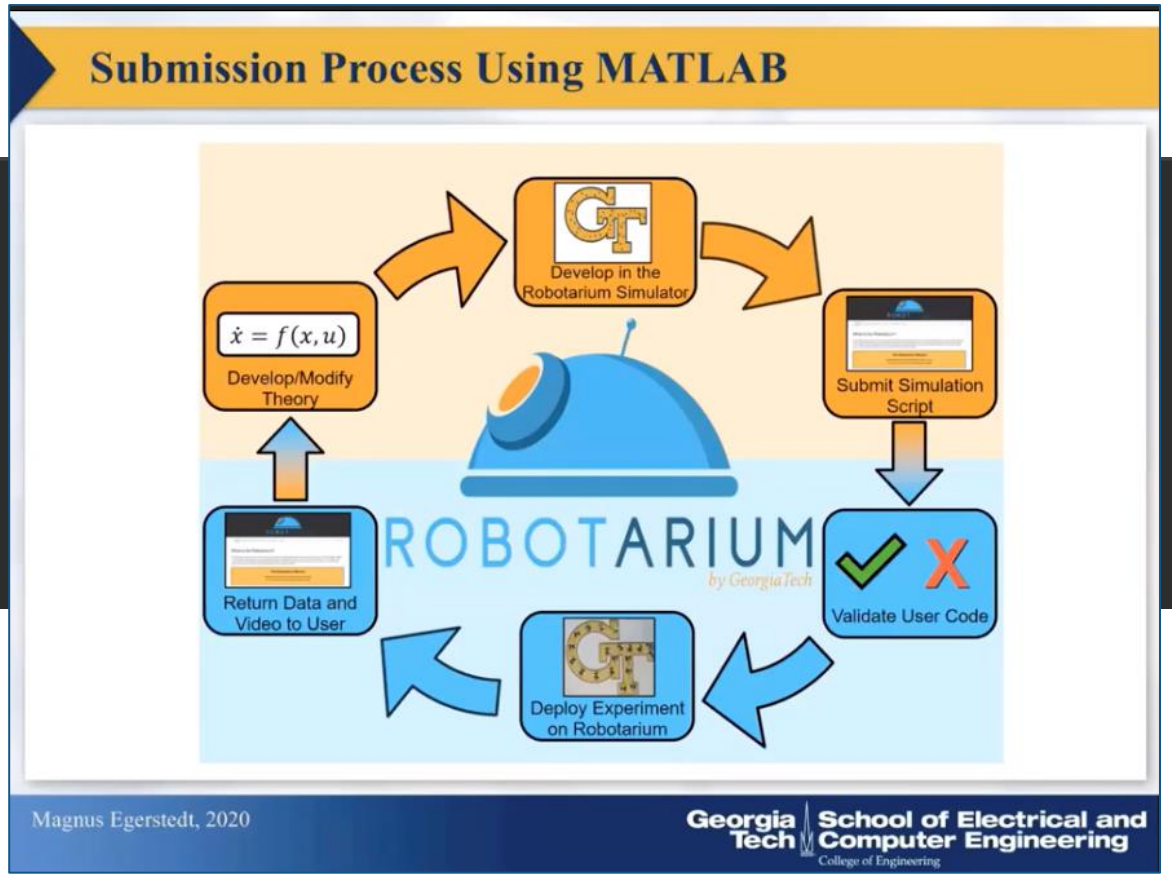




Remote Labs

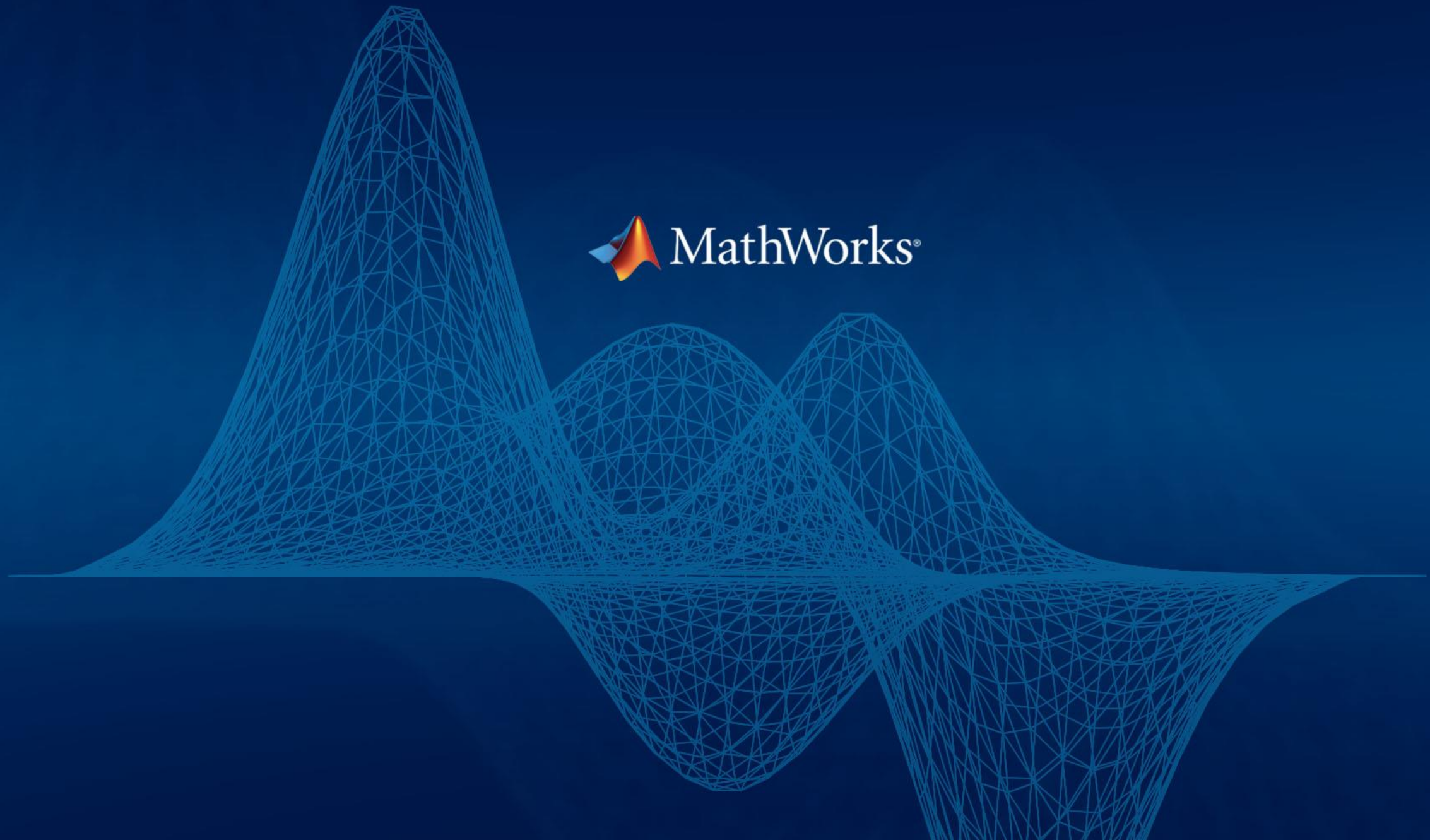
Robotarium at Georgia Tech

Remote



https://www.youtube.com/watch?v=rwN-FNWuJZY&t=104s

http://www.robotics.gatech.edu/robotarium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