

Auto-graded Assessments with MATLAB Grader

Supporting Technical Education Series - Resources & Open Discussions with MathWorks

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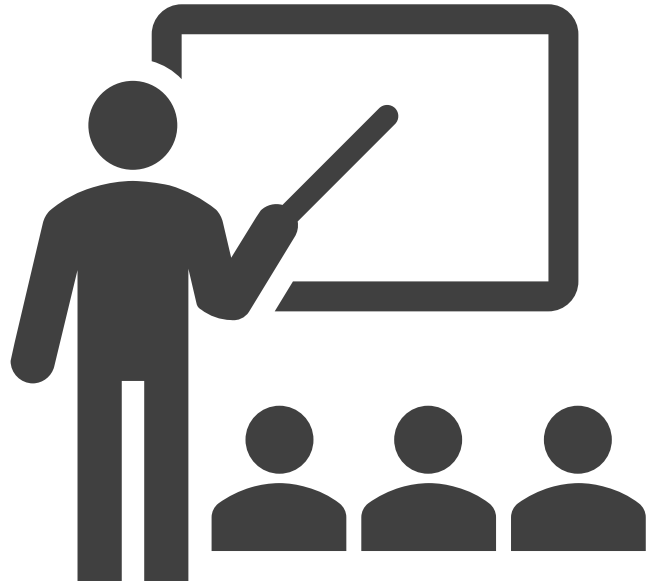
Jeff Alderson, jalderso@mathworks.com

Webinar start: 01:00 PM CET / 04:30 PM IST



- Use the Q & A functionality to ask questions to the speakers
- We'll host a **10-min Q & A at the end** & a **45-min feedback session next week** (April 28th, 01:00 PM CET / 04:30 PM IST)
- Information on accessing MATLAB and Simulink and placing request for trials will be covered in the presentation

The Rise of Online Learning

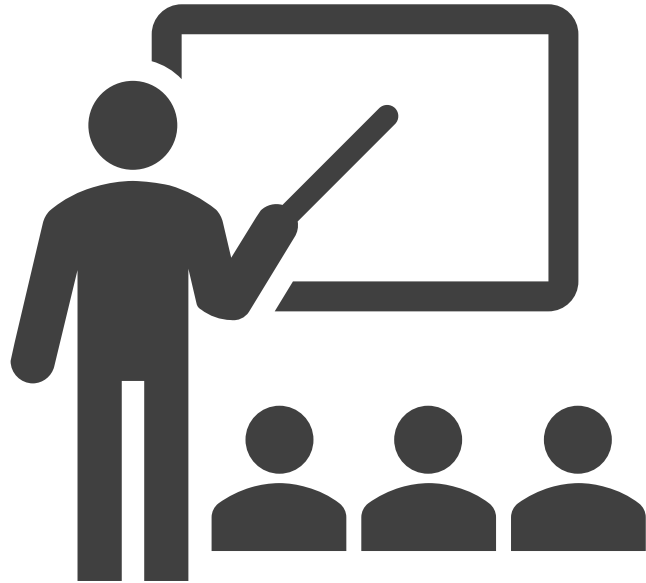


In-person classes



Online classes

The Rise of Hybrid Learning

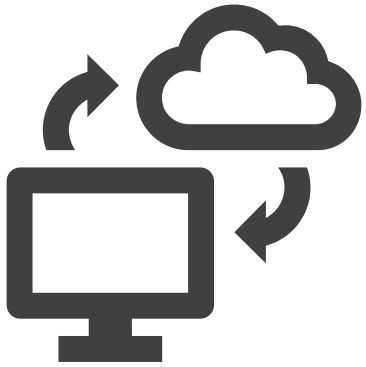


In-person classes



Online classes

Adapting your course



Access



Instruction



Assessment



Getting Help

Poll: Do you give out MATLAB-based assignments in your course?

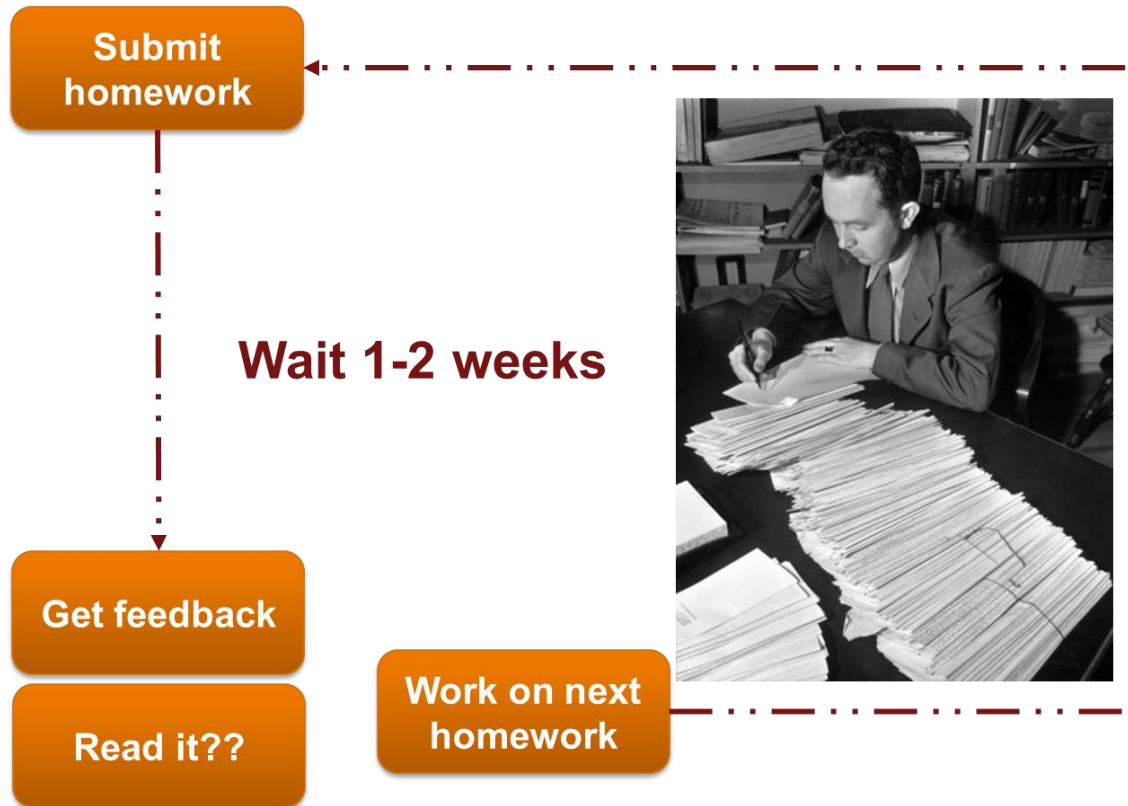
A. Yes

B. No

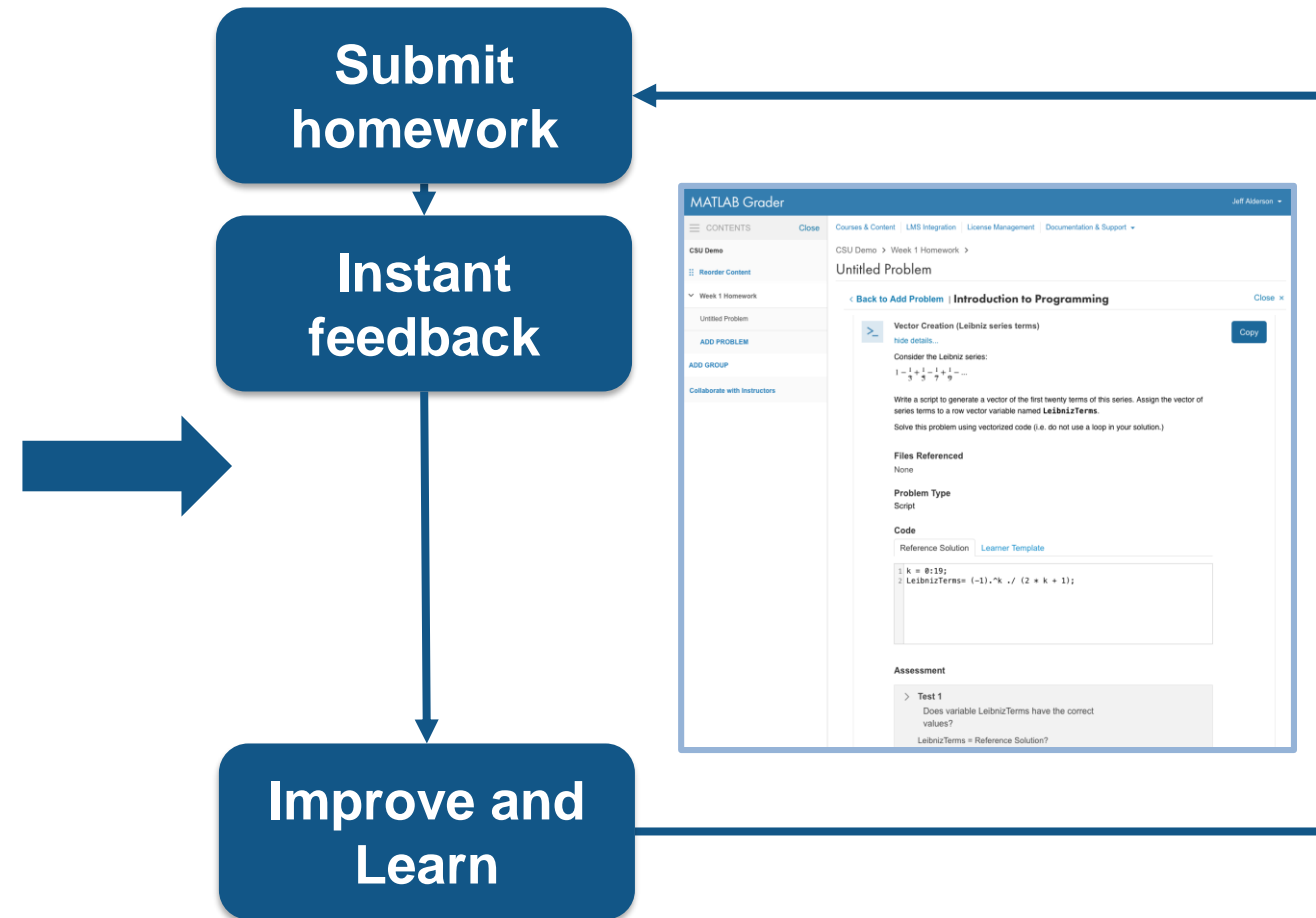
What is MATLAB Grader?

A tool to save time grading MATLAB code and provide immediate feedback to students

Traditional Grading



Auto-grading



Auto-graded Assessments using MATLAB Grader

Challenges in
Grading



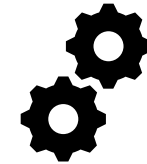
Solutions



Demo of MATLAB
Grader



LMS tools and
integration



Summary



Poll: What are the challenges in conducting effective assessments of MATLAB skills from an instructor's perspective?

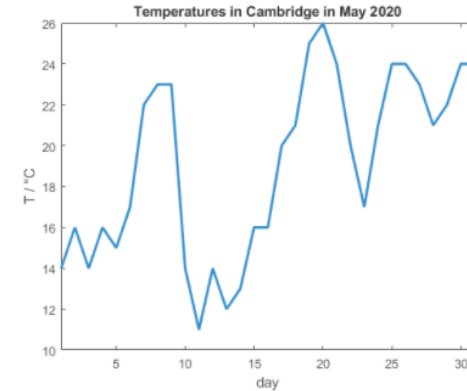
- A. Large number of submissions of assignments
- B. Evaluating accuracy of submitted code in a timely manner
- C. Identify concepts that need to be reinforced and students who need help
- D. All of the above

Poll: What are the challenges in attempting coding assignments from a student's perspective?

- A. Difficulty in understanding the assignment
- B. Time spent in assembling all components (problem, coding environment, etc.) required to complete the assignment
- C. Delayed feedback hinders the learning process
- D. All of the above

How MATLAB Grader addresses Challenges in Assessments?

- Generating interest in attempting assignments
 - Use pictures, links to video tutorials, and research papers
- Large number of submissions of assignments
 - Automated framework for assessment



Instructions:

Create a script that does the following:

- Load the temperature data "CambridgeTemperatures.dat" into a variable named **T**. Use the built-in function `load` for this.
- Visualize the temperatures with a **histogram**. Use the built-in function `histogram` for this. Add a title and a label for the x-axis.
- Compute the mean temperature and assign the value to the variable **meanTemperature**. Do not use the built-in function `mean` for this.

The mean is given by: $\mu = \sum_{i=1}^N A_i$.

Script

[Reset](#)[MATLAB Documentation](#)

```
1 % load temperature data
2 T =
3
4 % Visualize the data using a histogram
5
6 % Compute the mean temperature
7
```

[Run Script](#)

How MATLAB Grader addresses Challenges in Assessments?

- Generating interest in attempting assignments
 - Use pictures, links to video tutorials, and research papers
- Large number of submissions of assignments
 - Automated framework for assessment
- Evaluating accuracy of submitted code and provide timely feedback – Students receive MATLAB output and instantaneous feedback
- Identify concepts that need to be reinforced and students who need help – Learner analytics

Assessment: Incorrect Submit ?

✔ Is cross-sectional area correct?

✔ Is the Modulus of Elasticity correct?

✔ Is yield strength calculated correctly?

✔ Is ultimate strength correct?

✘ Is fracture strength correct?
Variable fracture has an incorrect value.

Verify that:

- strain data starts at 0 mm/mm, and stress starts at 0 Pa. Correct the raw data if necessary.
- fracture** is assigned a stress value with units of Pa

Learner Analytics

[Class Overview](#) [Learner Solutions](#)

Status Summary
8 Learners are in the course.

Status	Percentage	Count
Solved	50%	4
Submitted, not solved	13%	1
No solutions submitted	37%	3

Solved:
4 Learners have solved the problem.

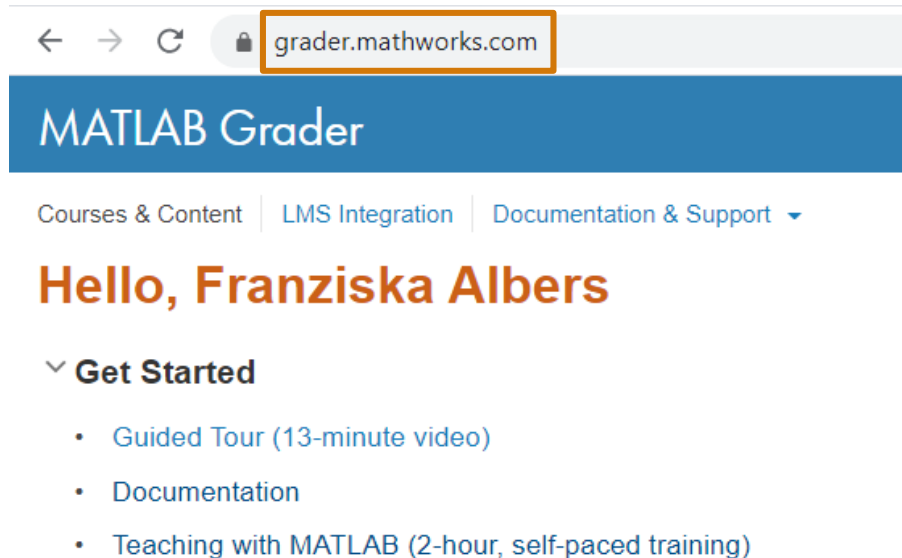
Submissions Required to Solve the Problem
Mean: 2

No. of Submissions	% Learners
1	50%
3	50%

MathWorks-Hosted Version and LMS Version

MathWorks-Hosted Version

- Access via grader.mathworks.com
- Students require a MathWorks account



LMS Version

- Access via the learning management system (Canvas, Blackboard, Moodle, ...)
- Students do not require a MathWorks account

MATLAB Grader Demo – MathWorks-Hosted Version

Instructor Workflow



Create Content

- Create a new problem
- Add a problem from Examples
- Create a problem from scratch

Share Content / Courses

- Invite TAs/graders/instructors
- Invite students / add to course syllabus

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

- Get instant feedback from test suites
- Submit solutions for assessment

Refine Solutions

- Use Solution Map to write better code
- Compare solution with peer submissions

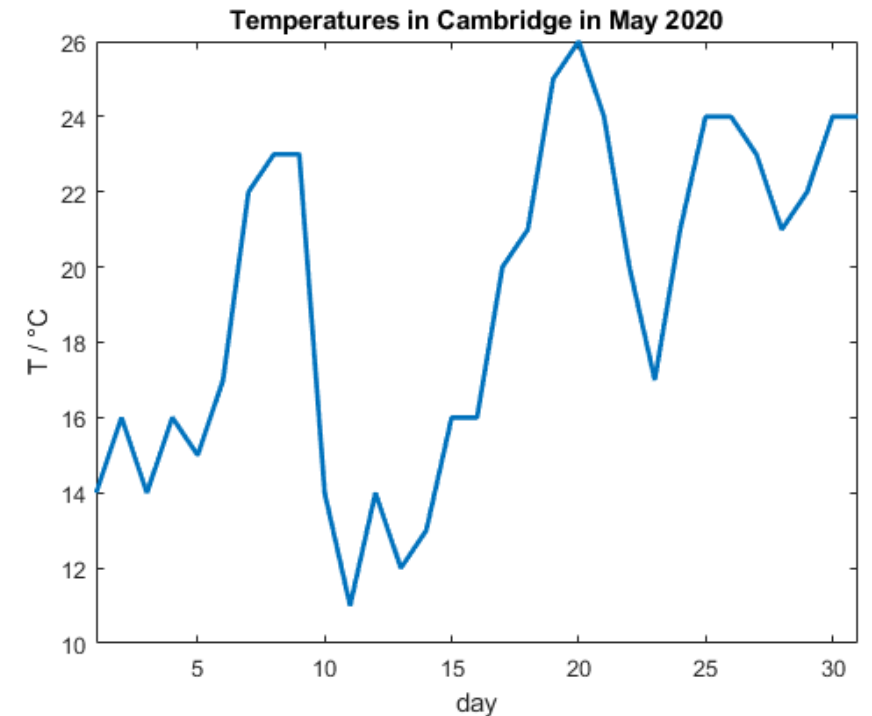
[For Instructors: Create Courses and Coding Problems](#)

[For Learners: Participate in Courses and Solve Problems](#)

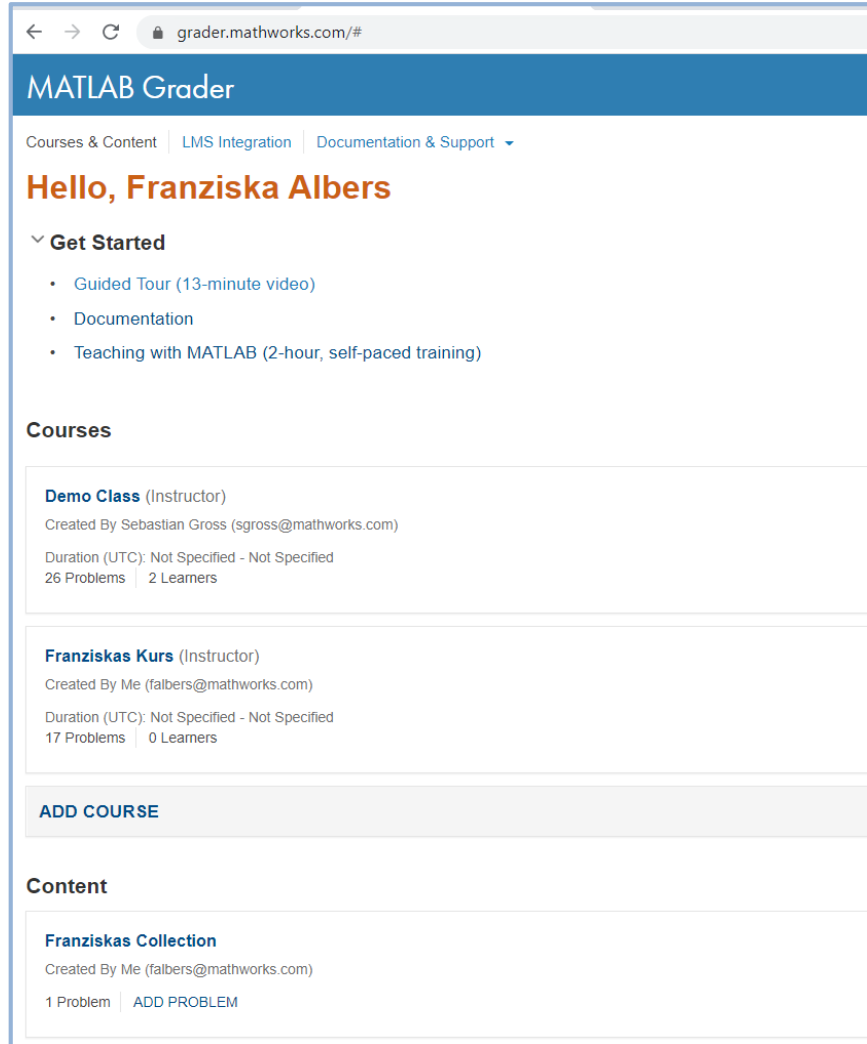
<https://grader.mathworks.com>

Example Exercise – Statistics of Cambridge Temperatures

- Load data from CambridgeTemperatures.dat and save in variable **T**
- Visualize the data with a histogram
- Compute the mean temperature



MATLAB Grader Demo: MathWorks-Hosted Version



grader.mathworks.com/#

MATLAB Grader

Courses & Content | LMS Integration | Documentation & Support ▾

Hello, Franziska Albers

Get Started

- Guided Tour (13-minute video)
- Documentation
- Teaching with MATLAB (2-hour, self-paced training)

Courses

Demo Class (Instructor)
Created By Sebastian Gross (sgross@mathworks.com)
Duration (UTC): Not Specified - Not Specified
26 Problems | 2 Learners


Franziskas Kurs (Instructor)
Created By Me (falbers@mathworks.com)
Duration (UTC): Not Specified - Not Specified
17 Problems | 0 Learners

ADD COURSE

Content

Franziskas Collection
Created By Me (falbers@mathworks.com)
1 Problem | [ADD PROBLEM](#)

Sign in to your MathWorks Account or create a new one.



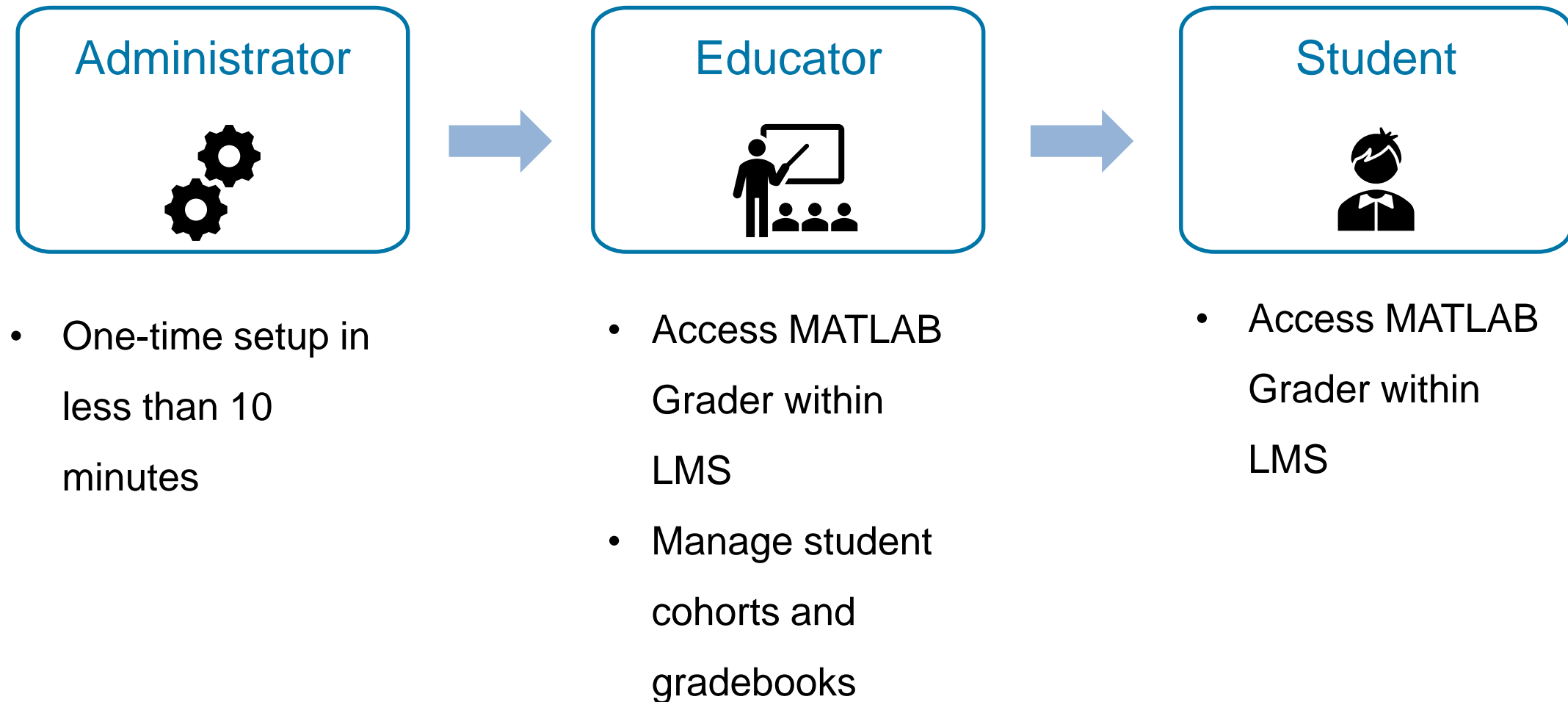
Email

No account? [Create one!](#)
By signing in you agree to our [privacy policy](#).

[Next](#)

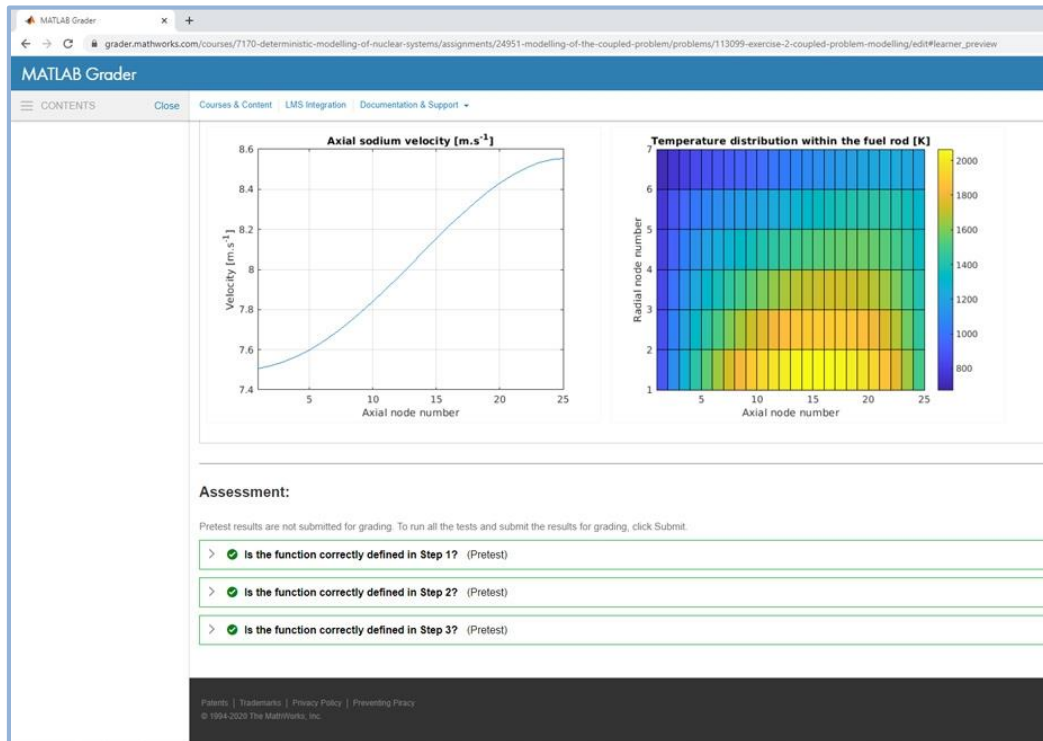
<https://grader.mathworks.com>

Integrate MATLAB Grader with your Learning Management System



User Story: Chalmers University of Technology

Course: Deterministic Modeling of Nuclear Systems

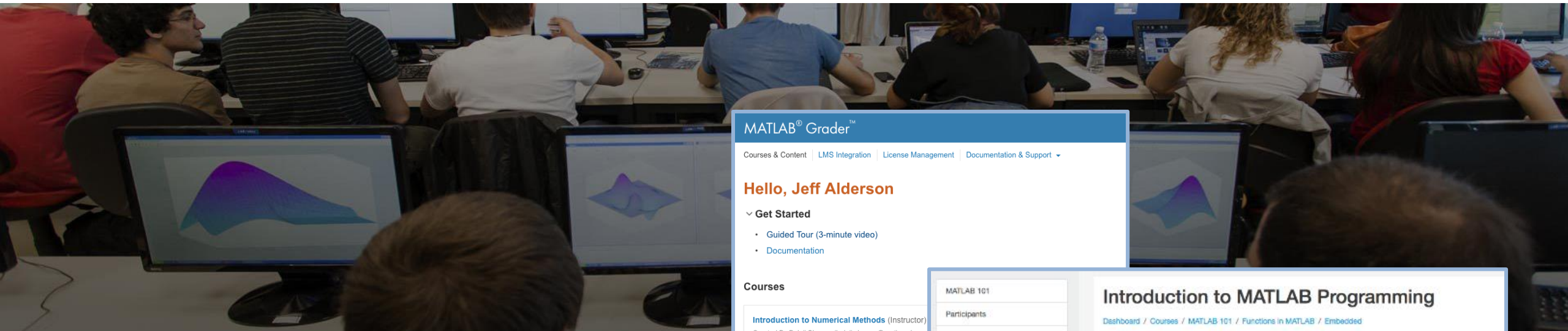


*“MATLAB Grader automatically grades the exercises and provides feedback, **leaving me and my teaching assistant free to work one-on-one with students.***

*The web-based MATLAB Grader interface also ensures that all students, whether local or remote, have **access to the same coding environment.**”*

-- Prof. Christophe Demaziere, Department of physics at Chalmers University of Technology, Sweden

MATLAB Grader



MATLAB® Grader™

Courses & Content | LMS Integration | License Management | Documentation & Support

Hello, Jeff Alderson

Get Started

- Guided Tour (3-minute video)
- Documentation

Courses

Introduction to Numerical Methods (Instructor)

Created By Balaji Sharma (balaji.sharma@mathworks.com)

Duration (EDT): 01 Jan 2018 - 03 Sep 2018
3 Problems | 3 Students

Copy of Introduction to Programming (Instructor)

Created By Eric Davishahi (edavishahi@everettcc.edu)

Duration (PDT): 03 Apr 2018 - 15 Sep 2018
94 Problems | 0 Students

Example Problems (Instructor)

Created By Aditya Jain (aditya.jain@mathworks.com)

Duration (UTC): Not Specified - Not Specified
11 Problems | 0 Students

[ADD COURSE](#)

MATLAB 101

Participants

Badges

Competencies

Grades

- General
- Variable Declaration in MATLAB
- Functions in MATLAB
- Database Toolbox

Dashboard

Site home

Calendar

Private files

My courses

LTI

Site administration

Introduction to MATLAB Programming

Dashboard / Courses / MATLAB 101 / Functions in MATLAB / Embedded

Embedded

Problem 1a: Estimating the value of Pi using Leibniz Series

One of the methods to estimate the value of pi is to use the Leibniz series expansion to a reasonably large number of terms and use the expression below to estimate the value of pi.

$$\pi/4 \approx 1 - 1/3 + 1/5 - \dots = \sum_{k=1}^n \frac{(-1)^{k+1}}{2k-1}$$

Using this expression, write a script to estimate the value of pi using a 100 terms. Your code should include the following variables:

```
estPi % Value of pi estimated using 100 terms in the series.
```

You can use the Learner Template code provided to develop your solution.

Your Script Save Reset MATLAB Documentation

```
1 nTerms = 100; % Number of terms to be used in the series expansion
2
3 % <Enter your code here>
4
5 estPi = ; % Estimated value of pi for 'N' values.
```

[Run Script](#)



Create interactive course assignments



Automatically grade student work and provide feedback



Run your assignments in any learning environment

Get started on MATLAB Grader for free today!

<https://grader.mathworks.com/>

For more information about MATLAB Grader:

<https://www.mathworks.com/products/matlab-grader.html>

Interested in LMS Integration?

Have your LMS Admin contact your MathWorks representative or emeaseries@mathworks.com.

Join the Office Hours on April 28th at 1 pm CEST/ 4:30 pm IST