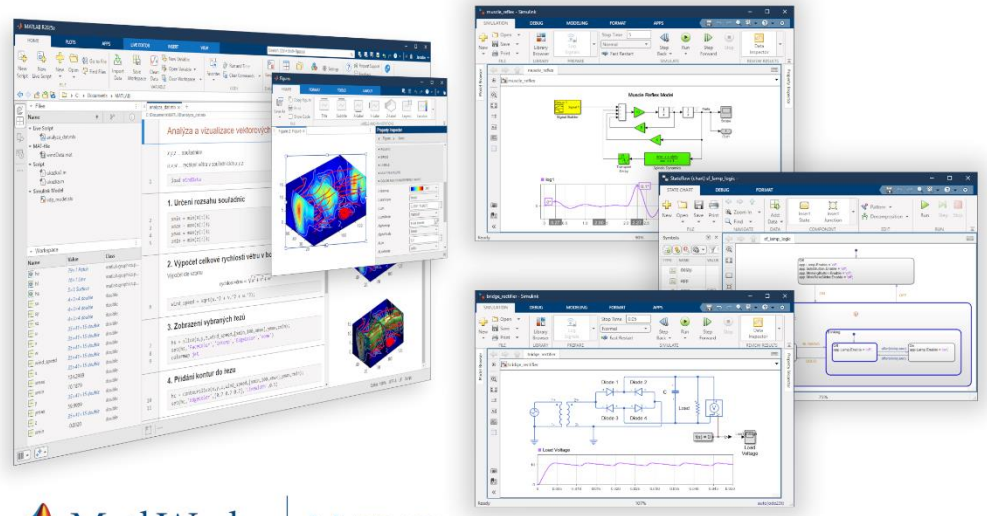
Nové nástroje, materiály a služby v oblasti vzdělávání



MathWorks Authorized Reseller | MATLAB & SIMULINK

Michal Blaho
blaho@humusoft.sk

Martin Foltin
foltin@humusoft.sk

www.humusoft.cz
info@humusoft.cz

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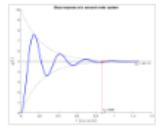
MATLAB CourseWare

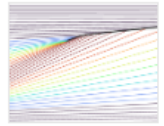
- Interaktívny obsah a príklady
  - vytvorený MathWorks a učiteľmi
- Obsah podľa typu
  - aplikácie, príklady, laboratória
- Obsah podľa disciplín
  - riadenie, štatistika, biológia
- Úroveň vzdelania
  - základné a stredné školy
  - univerzity
- Ďalšie zdroje na GitHube
  - MathWorks Teaching Resources

Control Systems - University of Cape Town
An introductory control systems course, which is intended to delivery fundamental concepts with the use of interactive MATLAB Live Scripts.
Downloads (30 days)
★★★★★
Courseware Type: Interactive Examples, Labs, Projects
Education Levels: Undergraduate

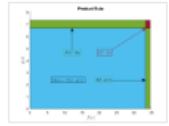


Machine Learning for Regression
Interactive module that introduces typical workflow, setup, and considerations involved in solving regression problems with machine learning
Downloads (30 days)
★★★★★
Courseware Type: Interactive Examples
Education Levels: Undergraduate

Applied Partial Differential Equations
A collection of teaching scripts applying partial differential equations to traffic modeling, battery thermal modeling, diffusion, and more.
Downloads (30 days)
★★★★★
Courseware Type: Interactive Examples
Education Levels: Graduate, Undergraduate



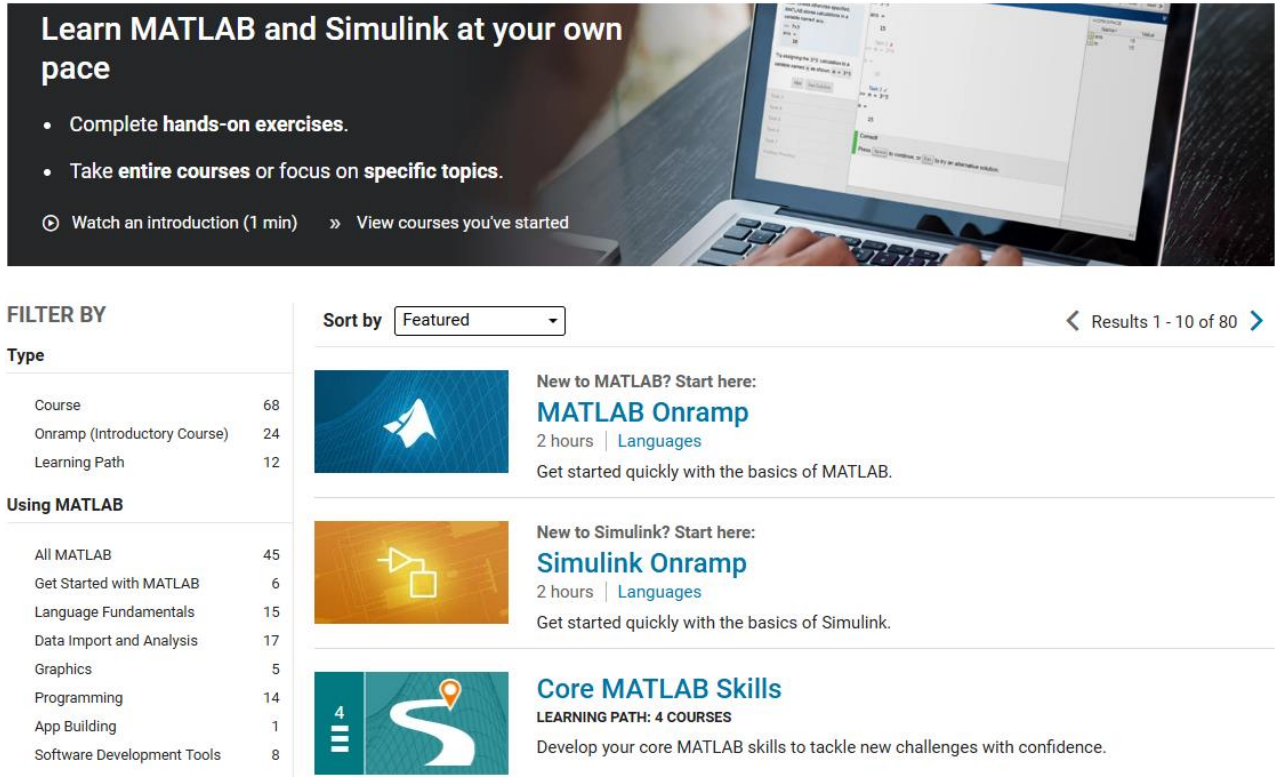
Calculus Derivatives
Interactive module that introduces fundamentals of derivatives including the product and chain rule as presented in Calculus I courses
Downloads (30 days)
★★★★★
Courseware Type: Interactive Examples
Education Levels: Undergraduate



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

Sada kurzov Online Training Suite

- Sada online kurzov
  - MATLAB Academy
- K dispozícii kedykoľvek a kdekoľvek
  - stačí počítač s webovým prehliačom
- Vlastným tempom
  - možnosť kurz kedykoľvek prerušiť
- Priebežné kvízy
  - okamžitá spätná väzba k riešeniu úloh
- Certifikát o absolvovaní kurzu
  - pdf alebo online odkaz
- Pre učiteľov možnosť „sledovať pokrok“ študentov v kurze



https://matlabacademy.mathworks.com

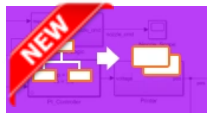
Build Simulink Proficiency

- Kurz o efektívnom využívaní prostredia Simulink
  - krátke videá a praktické cvičenia
  - automatizované hodnotenia
  - okamžitá spätná väzba

- Témy zahŕňajú:
  - základy Simulinku
  - modelovanie dynamiky a organizácia modelu
  - opakovane použiteľné komponenty
  - zlepšenie výkonu simulácie

The Simulink Environment

Model Dynamic Systems



Create Model Hierarchy with Subsystems

Model System Components

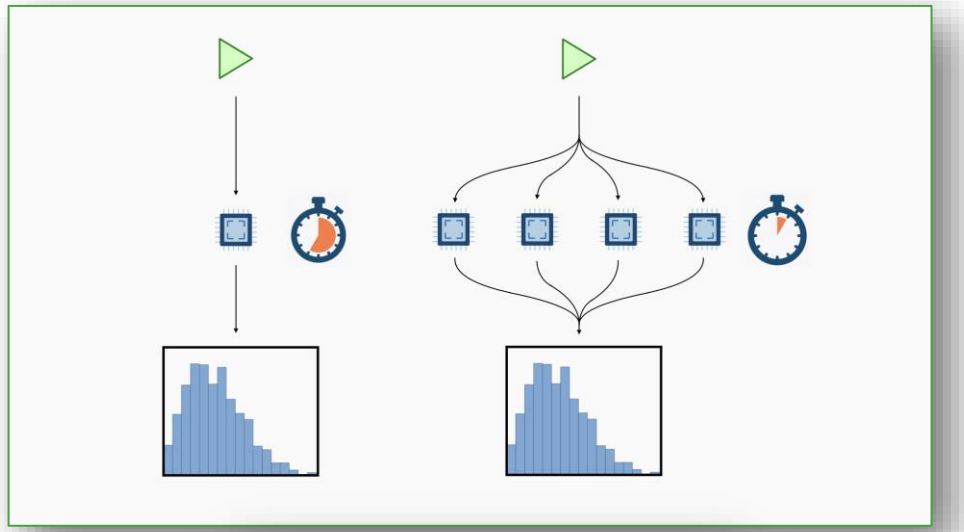
Configure Simulink Solvers to Improve Performance

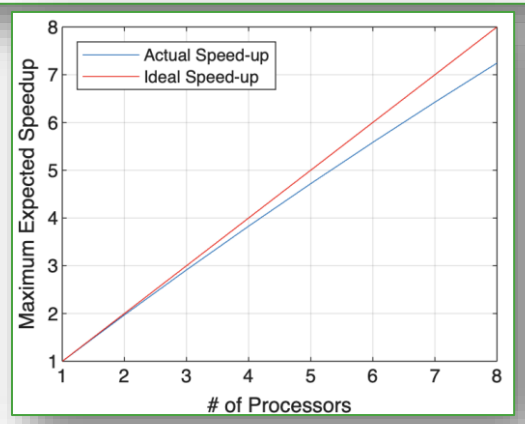
https://matlabacademy.mathworks.com/details/build-simulink-proficiency/lpslbsp

Parallel Computing Onramp

- Bezplatný krátky kurz o zrýchlení kódu využitím viacerých jadier CPU
  - krátke videá a praktické cvičenia
  - automatizované hodnotenia
  - okamžitá spätná väzba

- Témy zahŕňajú:
  - konverziu sériového kódu na paralelný
  - parallel pool a MATLAB workers
  - premenné v parfor cykloch
  - prenos dát a komunikácia





https://matlabacademy.mathworks.com/details/parallel-computing-onramp/orpc

Motor Control Algorithms with Simulink and Simscape

- Kurz o modelovaní a riadení PMSM s Motor Control Blockset and Simscape Electrical
  - krátke videá a praktické cvičenia
  - automatizované hodnotenia
  - okamžitá spätná väzba

Introduction to Motor Control

Motor Modeling with Simscape Electrical

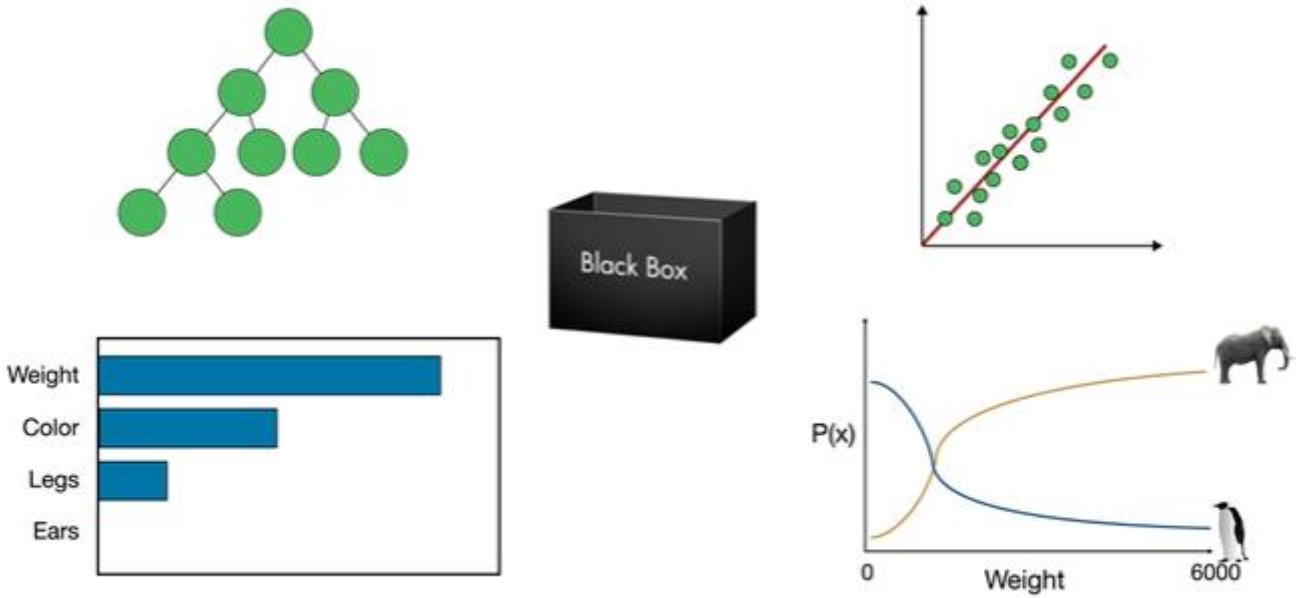
Control Techniques for PMSM

- Témy zahŕňajú:
  - modelovanie elektromotorov
  - presnosť modelu
  - riadenie V/F a vektorové riadenie (FOC)
  - automatické ladenie zosilnení

https://matlabacademy.mathworks.com/details/motor-control-algorithms-with-simulink-and-simscape/lpslmca

Explainable Machine Learning

- Kurz o interpretovaní rozhodnutí modelov strojového učenia
  - krátke videá a praktické cvičenia
  - automatizované hodnotenia
  - okamžitá spätná väzba

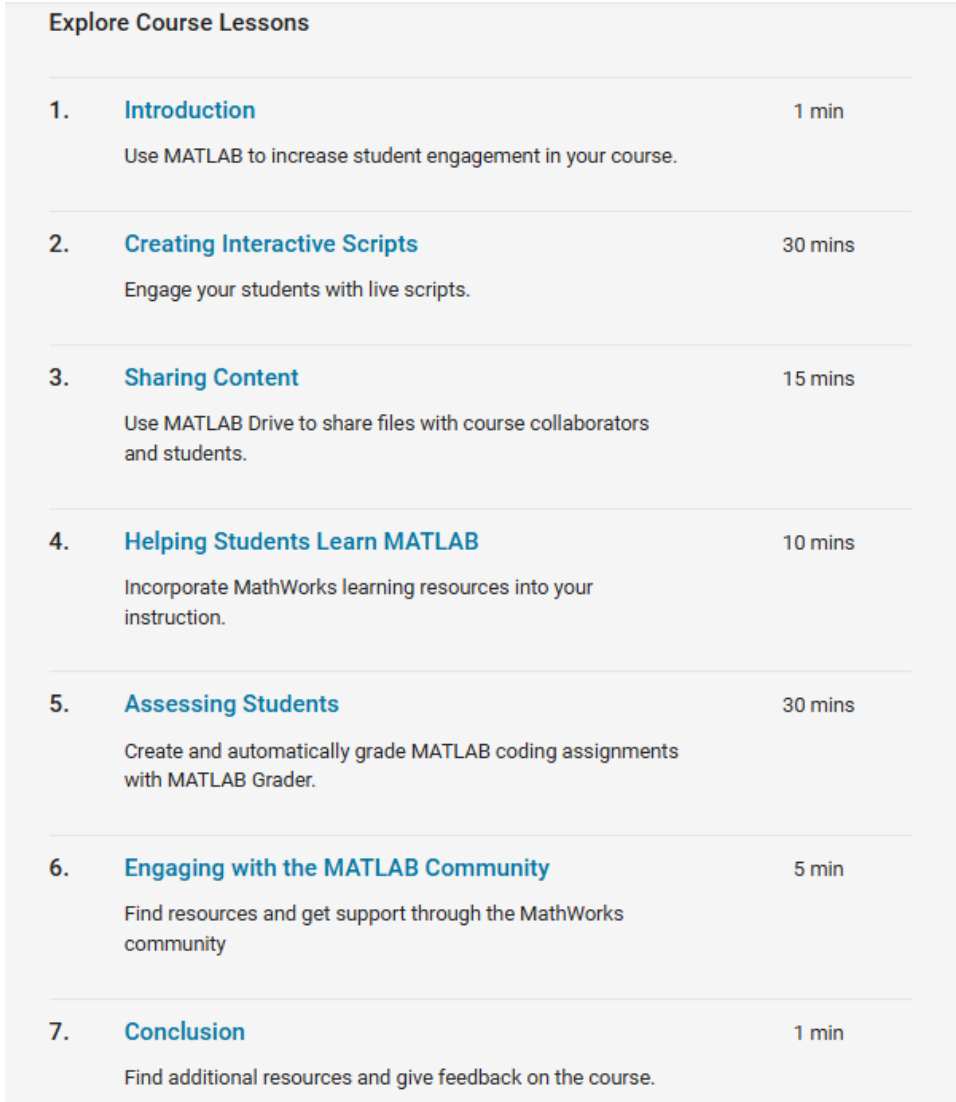


- Témy zahŕňajú:
  - interaktívne trénovanie modelu
  - interpretovateľné modely
  - globálne vysvetlenie modelu
  - lokálne vysvetlenie modelu

https://matlabacademy.mathworks.com/details/explainable-machine-learning/otmleml

Teaching with MATLAB

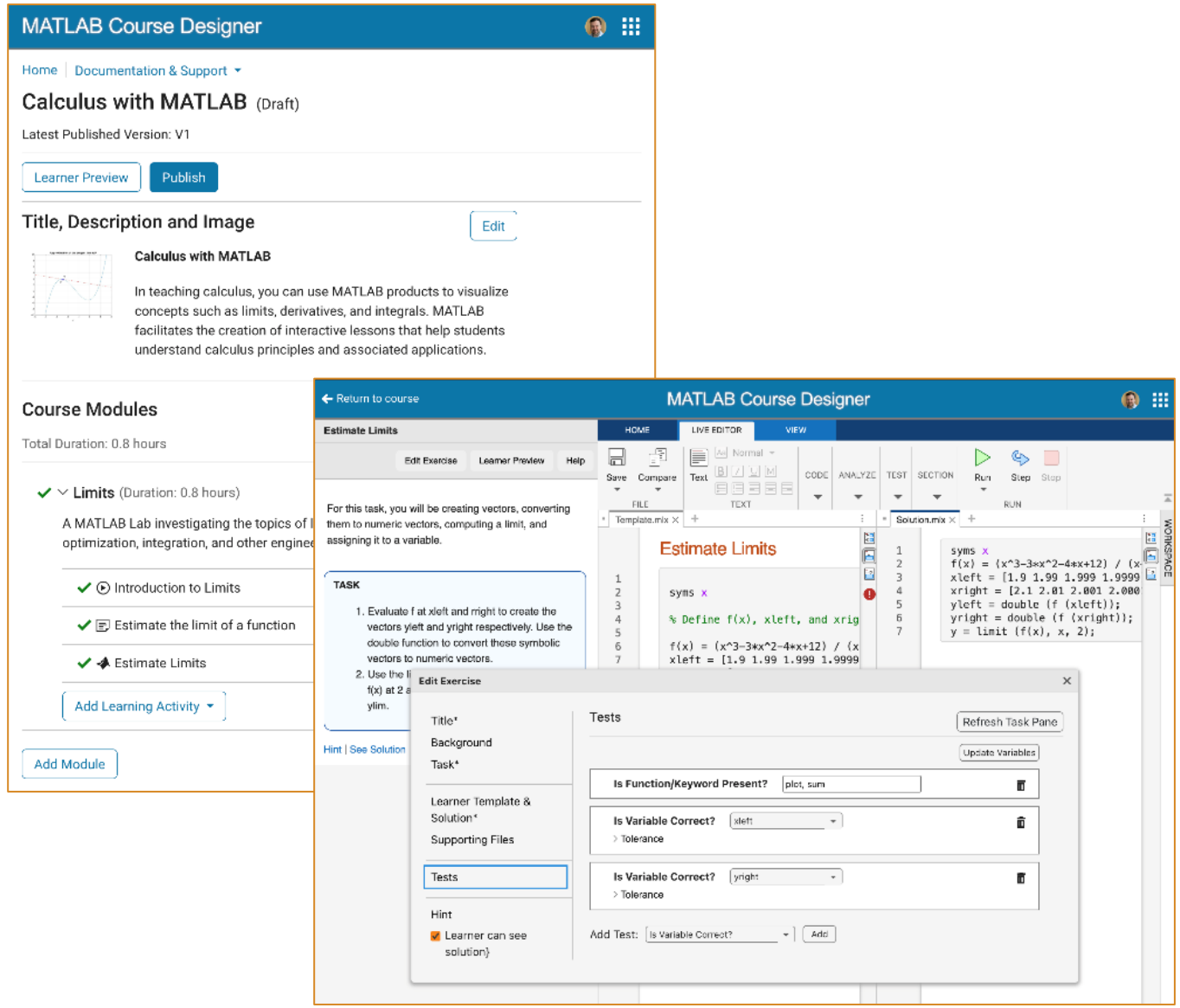
- Kurz zameraný na učiteľov
  - tvorba pútavých predmetov s online nástrojmi
- Tvorba interaktívnych skriptov
  - zapojenie študentov pomocou Live skriptov
- Zdieľanie obsahu v MATLAB Drive
  - zdieľanie materiálov s kolegami a študentmi
- Podpora výučby prostredia MATLAB
  - zahrnutie vzdelávacích materiálov
- Hodnotenie študentov
  - automatické hodnotenie v MATLAB Grader
- Spolupráca s komunitou



https://matlabacademy.mathworks.com/details/teaching-with-matlab/instructoronboard

MATLAB Course Designer

- Tvorba a úprava aktivít
- Zoskupenie aktivít pre spoluprácu a zdieľanie
- Hodnotenia s automatickým známkovaním
- Sledovanie priebehu a dokončenia aktivít
- Texty, videá, interakcie s MATLABom a Simulinkom
- 1EdTech certifikácia pre integráciu LMS pomocou LTI 1.3



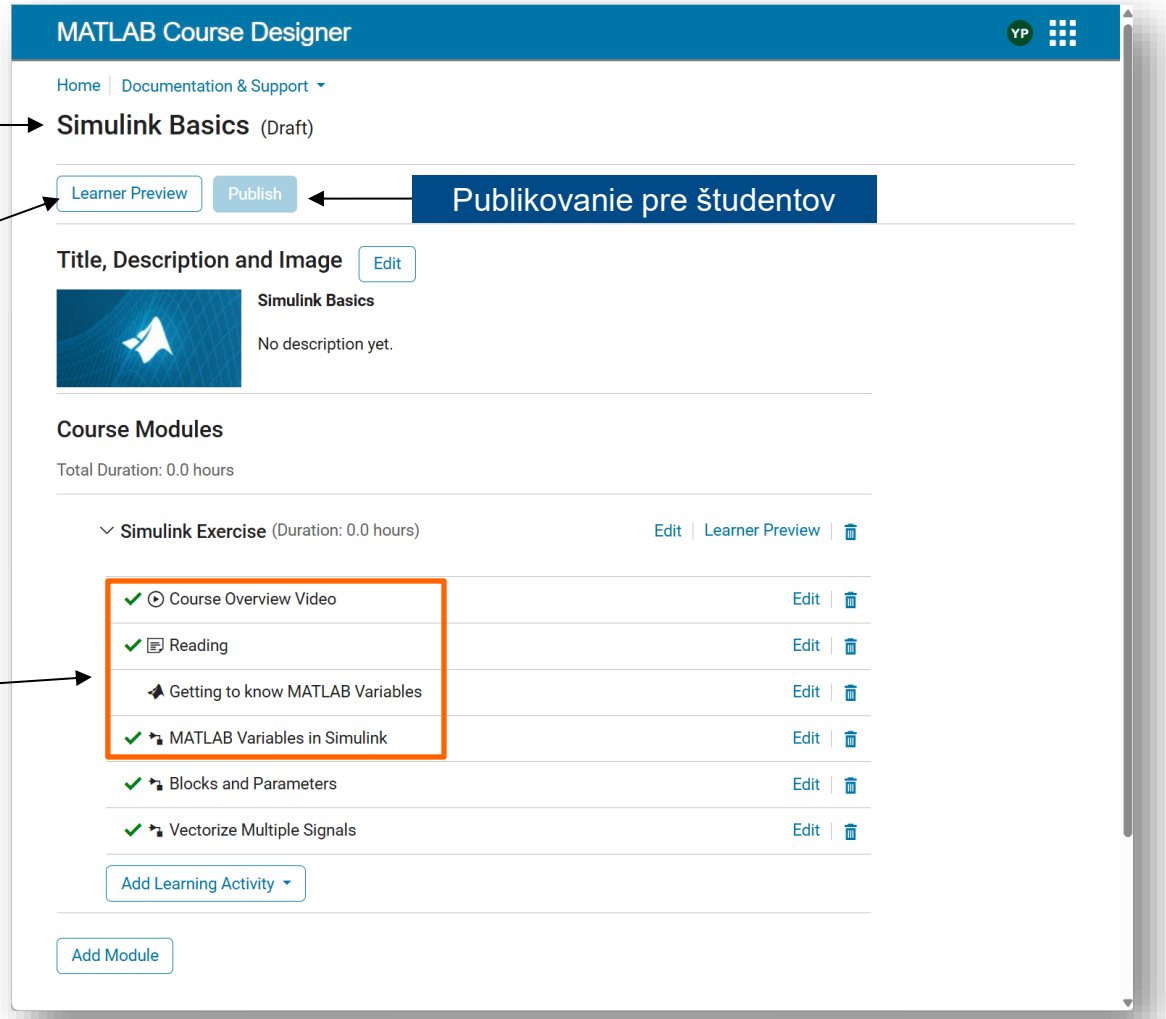
https://course-designer.mathworks.com/

Tvorba kurzu

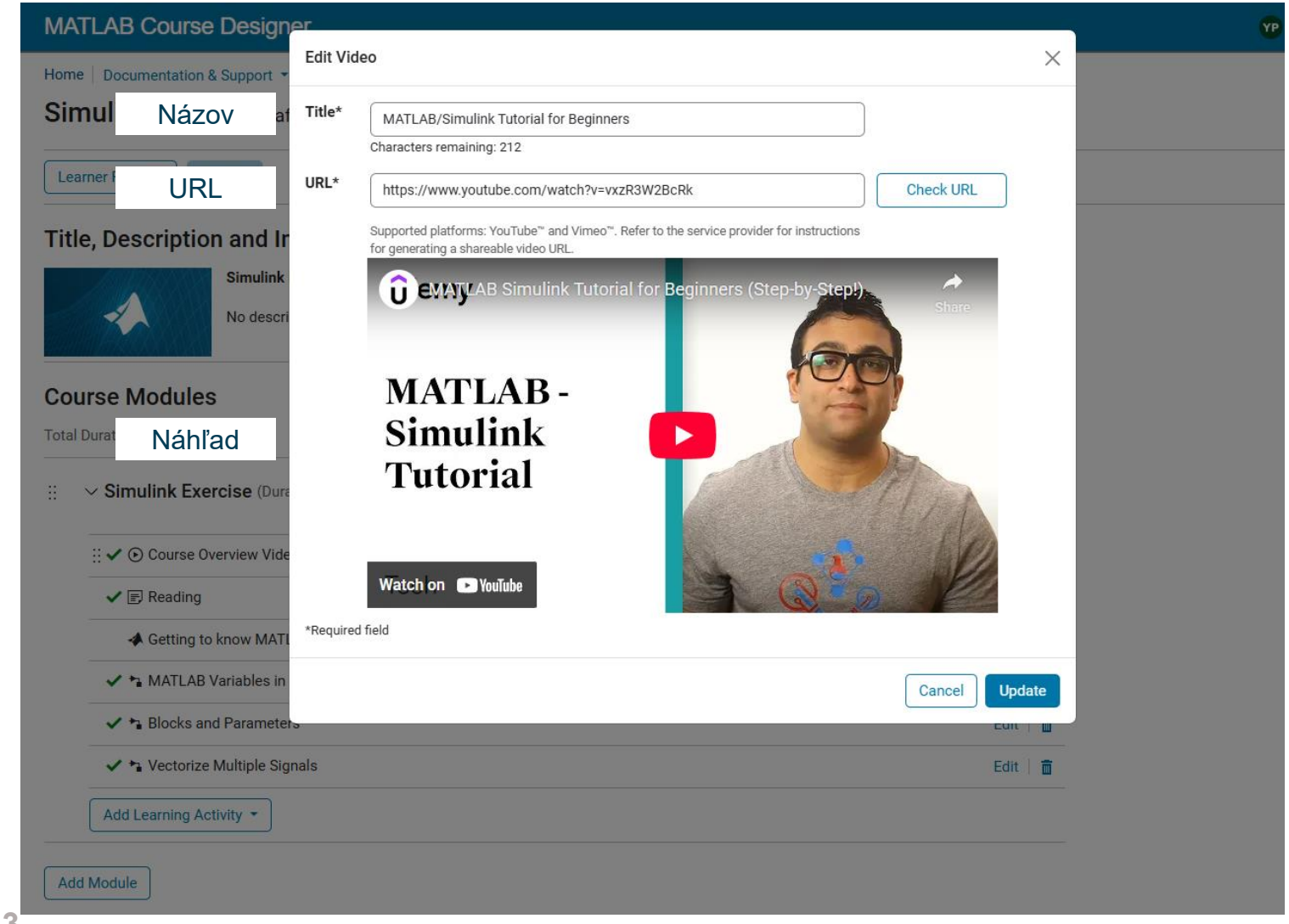
Vytvorenie kurzu

Náhľad kurzu

Vytvorte aktivity na čítanie, video, cvičenia v MATLABe a Simulinku



Vkladanie videí



Podporované platformy

Textový popis

Latex vzorec

Odkaz

Obrázok

Ukážka kódu

Edit Reading

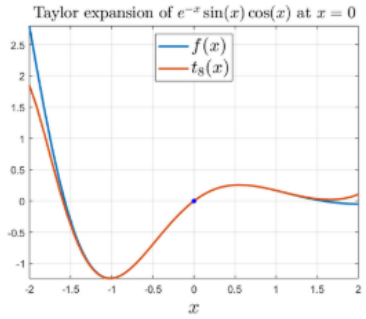
Title* Reading section

Normal B I U M TEXT CODE INSERT

The nth degree Taylor series (expansion) of a function $f(x)$ at $x = a$ is defined as:

$$t_n(x) = \sum_{k=0}^{n} \frac{f^{(k)}(a)}{k!}(x-a)^k = f(a) + f'(a)(x-a) + \frac{f''(a)}{2}(x-a)^2 + \cdots + \frac{f^{(n)}}{n!}(x-a)^n$$

Write a script below to compute the Taylor series approximation of $f(x) = e^{-x}\sin(x)\cos(x)$ at $x = 0$ for $n = 8$ using symbolic variables. Complete the steps below:

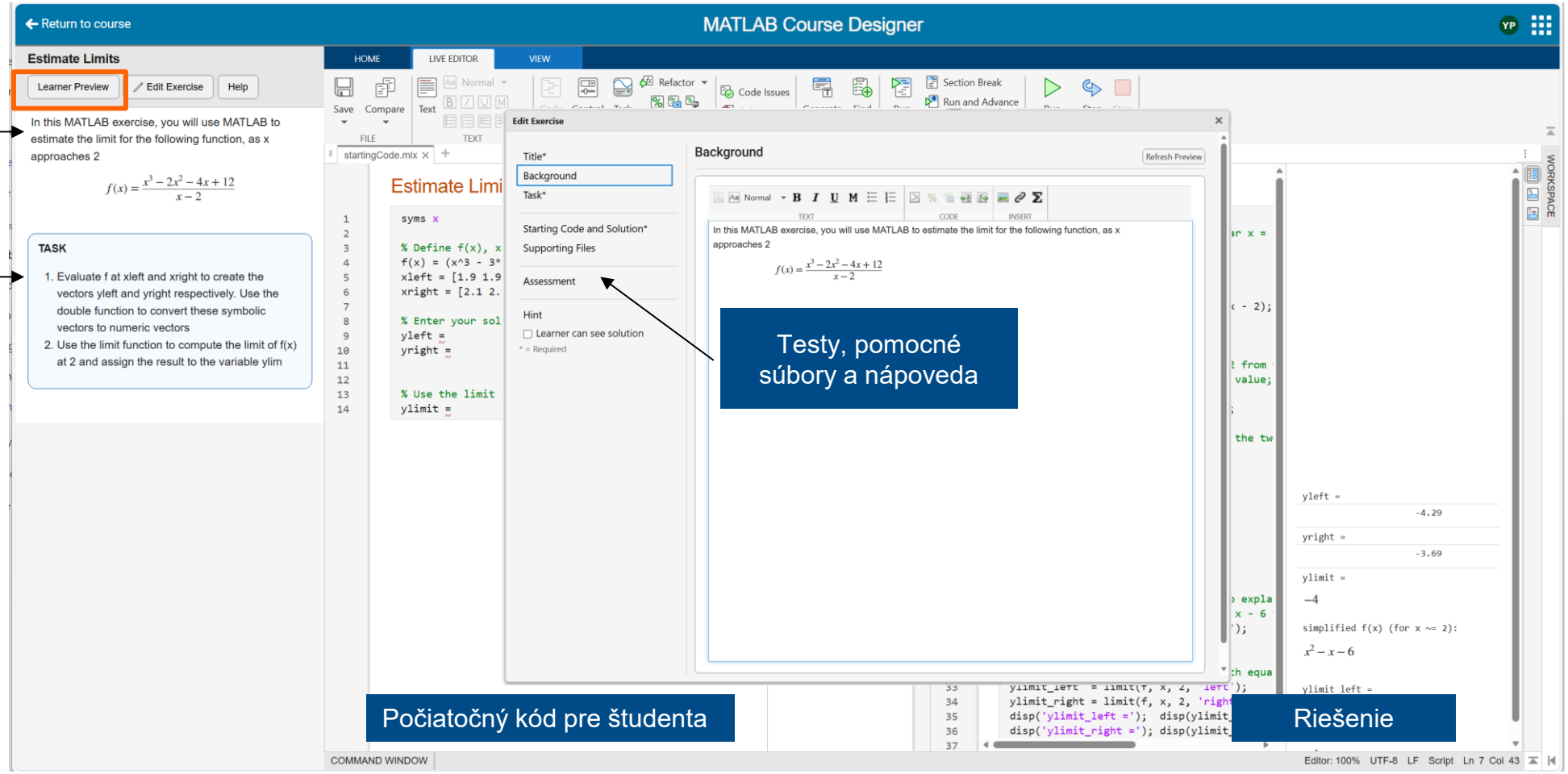


Example Starting Code:

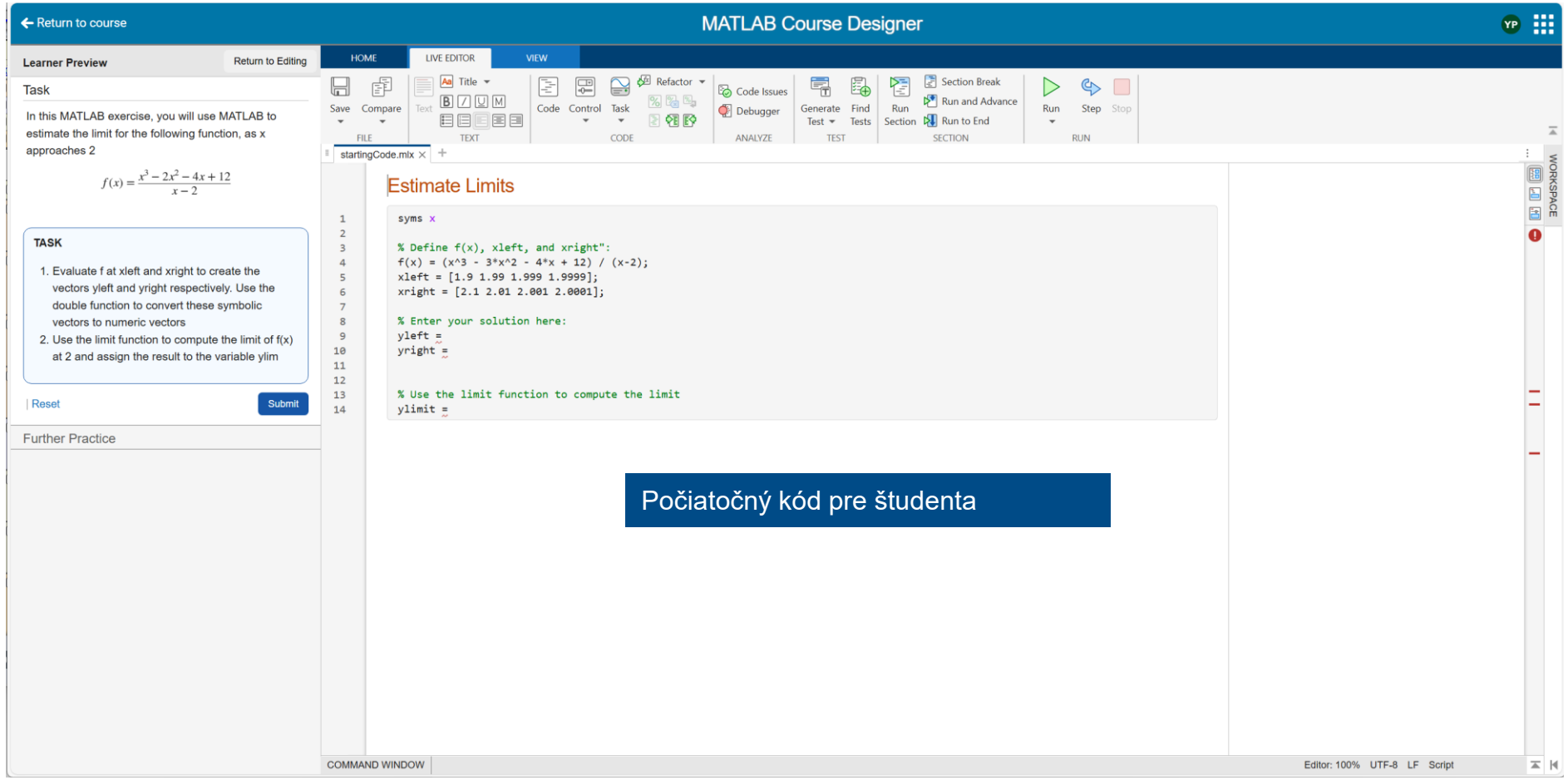
```
syms x
f(x) = exp(-x)*sin(x)*cos(x)
t_8(x) = taylor(f(x),'Order',9)
```

Cancel Update

Tvorba úlohy

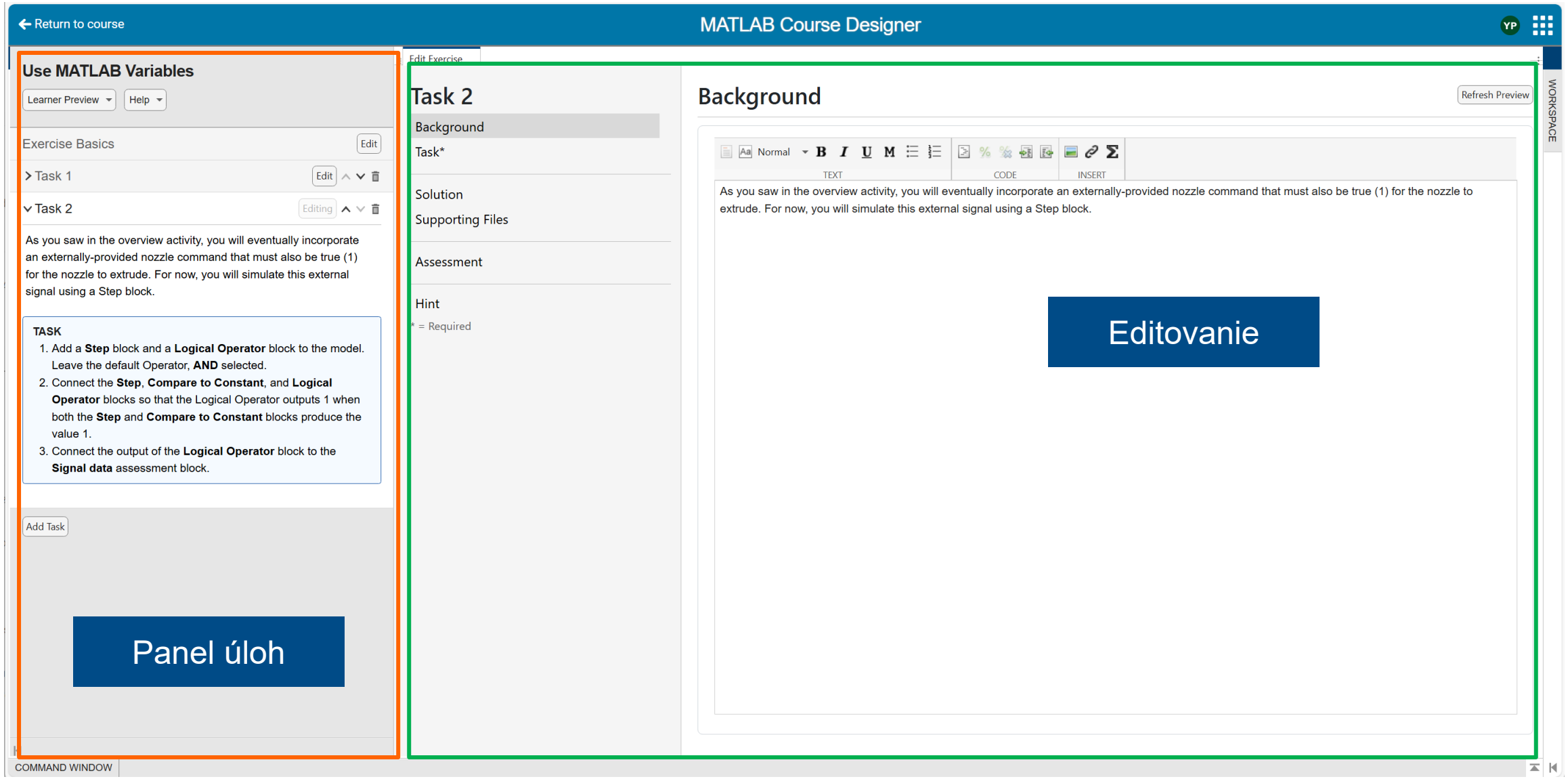


Ako uvidí úlohu študent



Počiatočný kód pre študenta

Úloha v Simulinku – tvorba obsahu

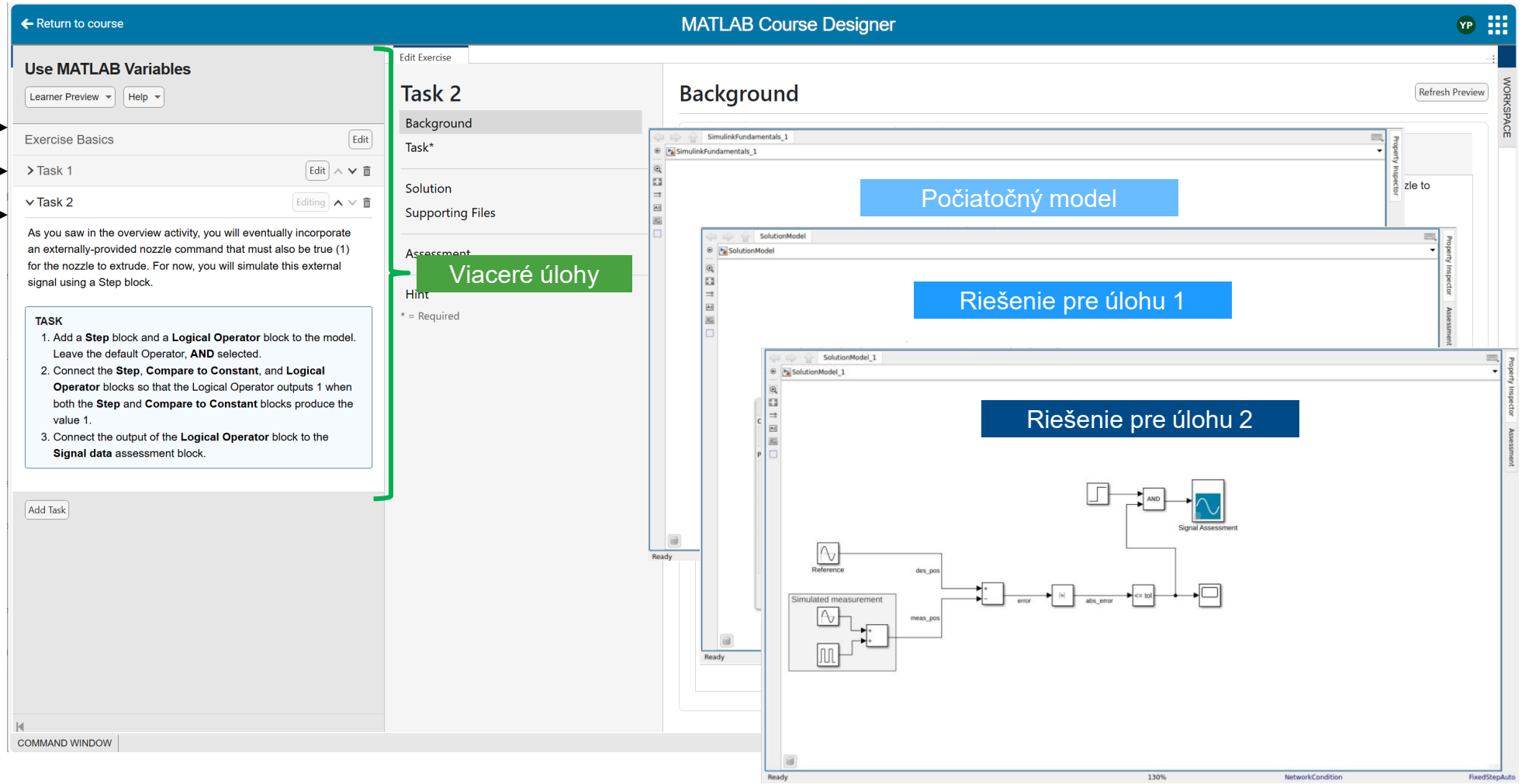


Úloha v Simulinku – viaceré riešenia

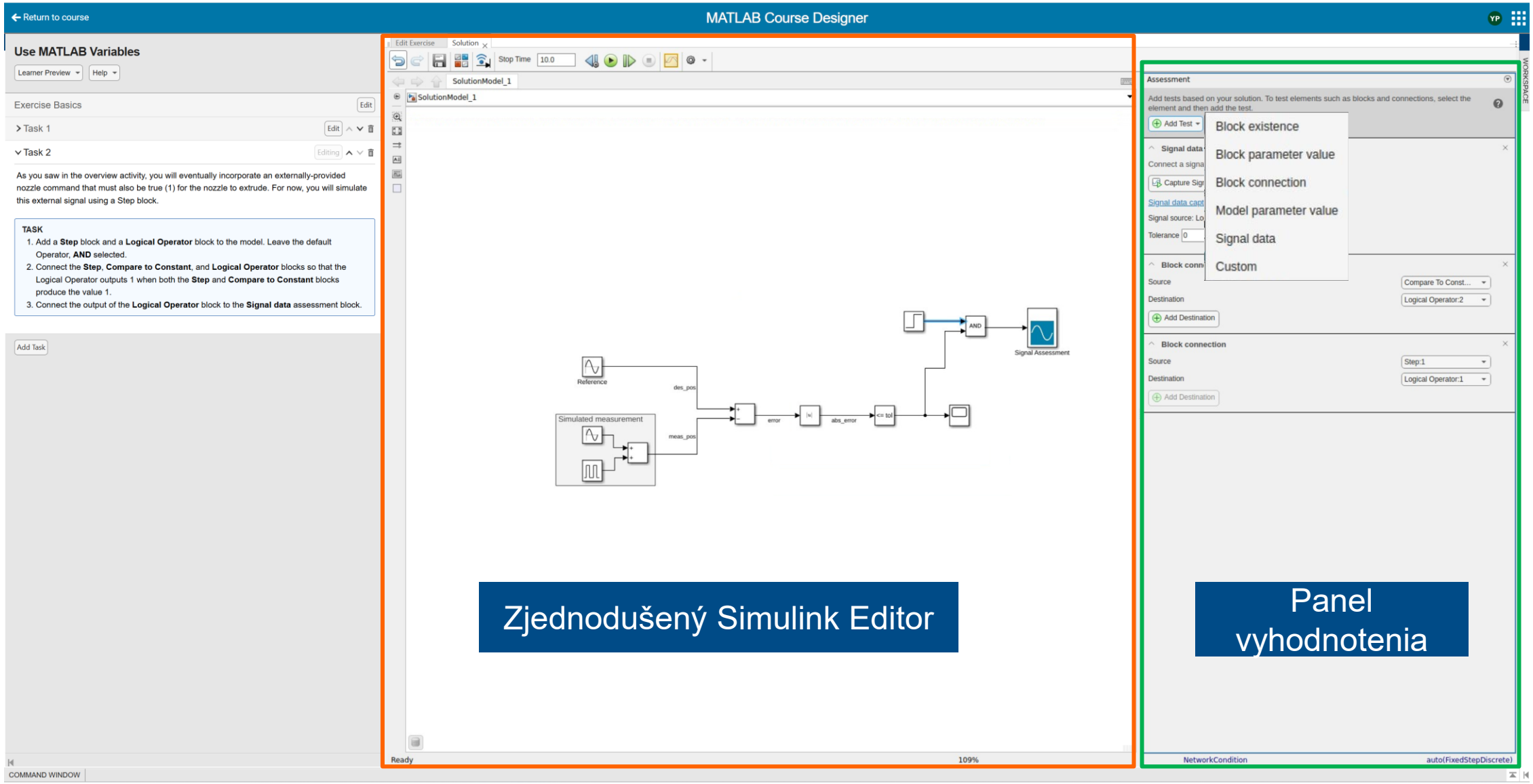
Počiatočný model

Riešenie pre úlohu 1

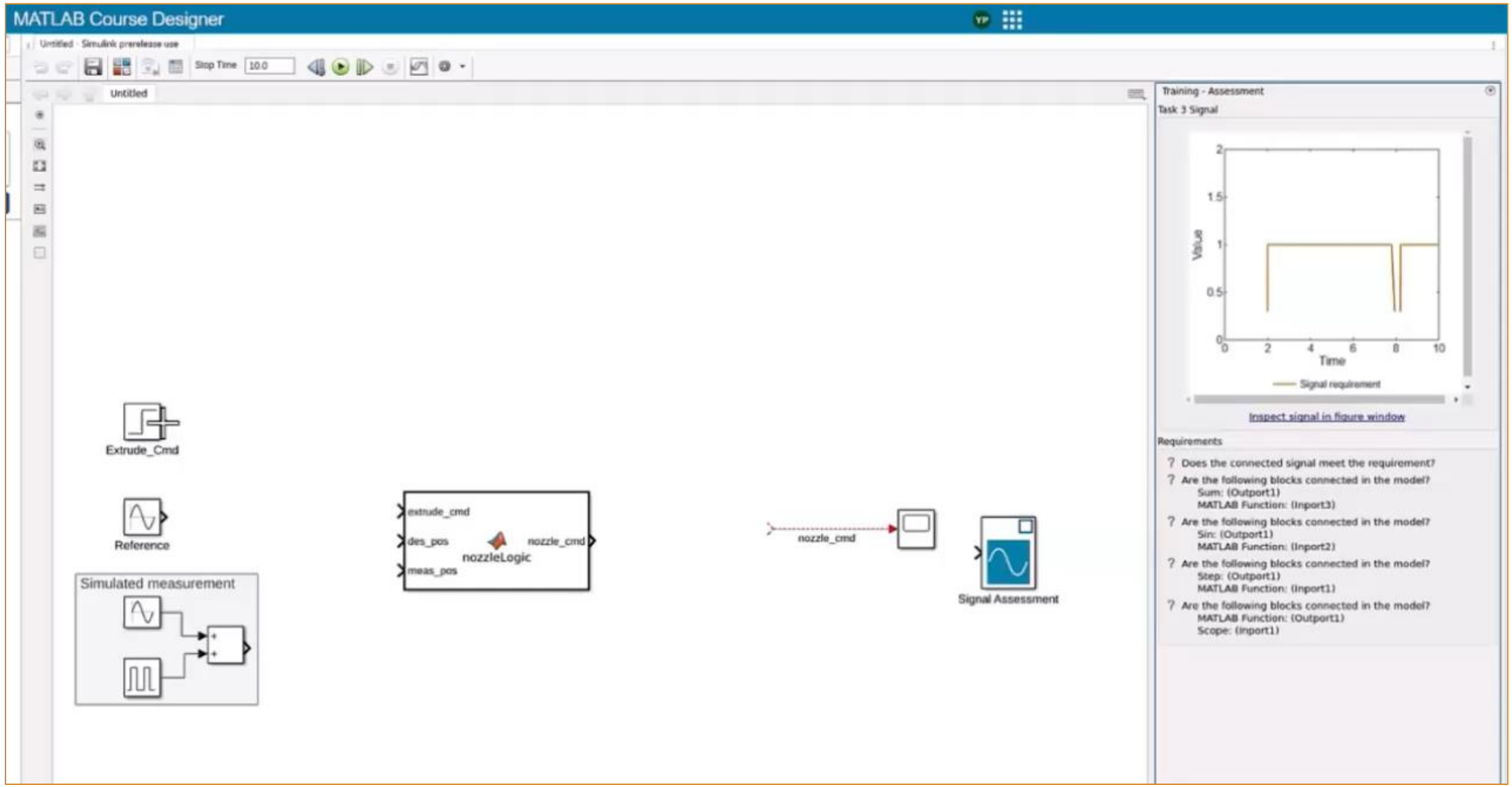
Riešenie pre úlohu 2



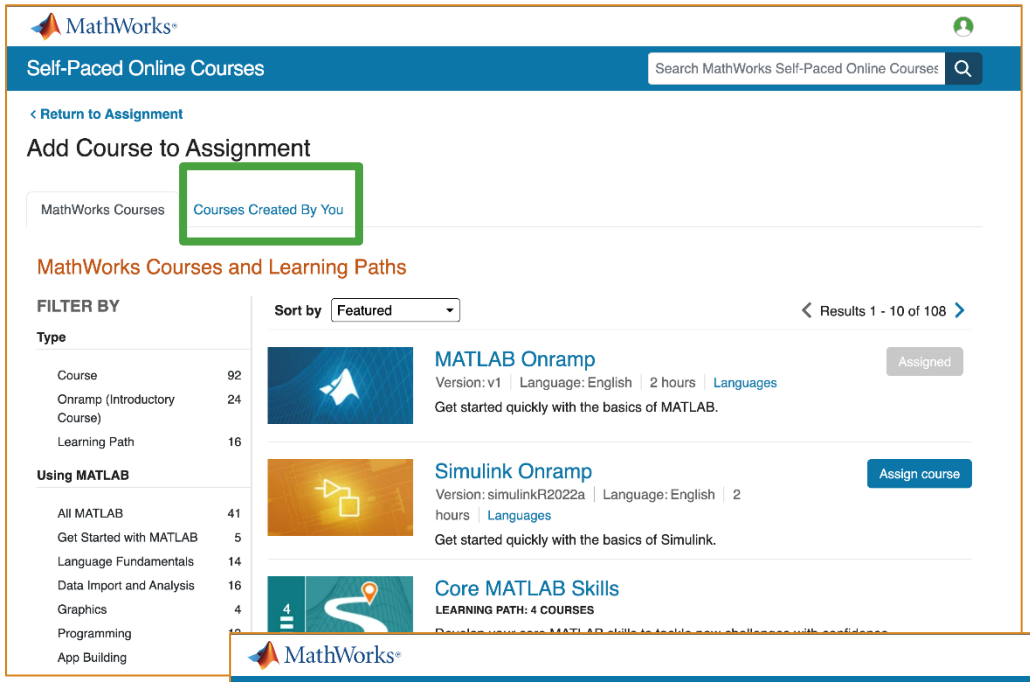
Úloha v Simulinku – vyhodnocovanie

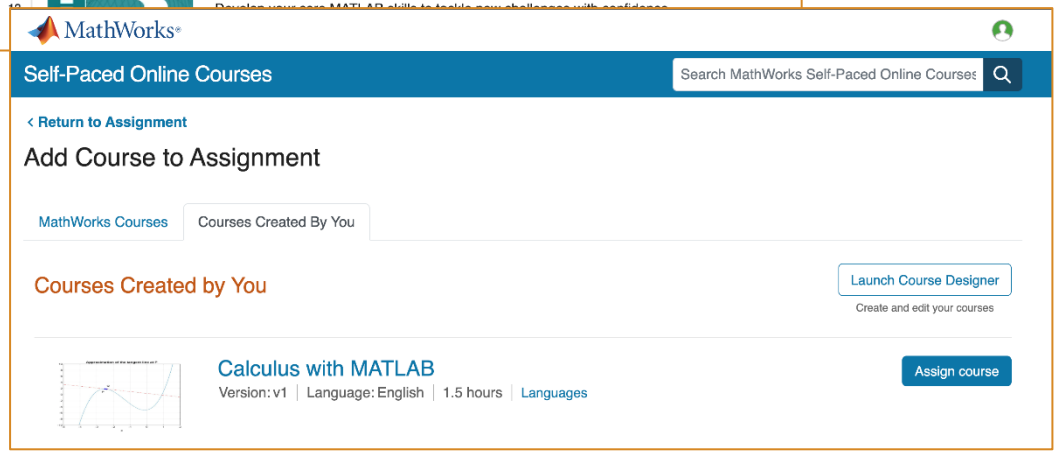


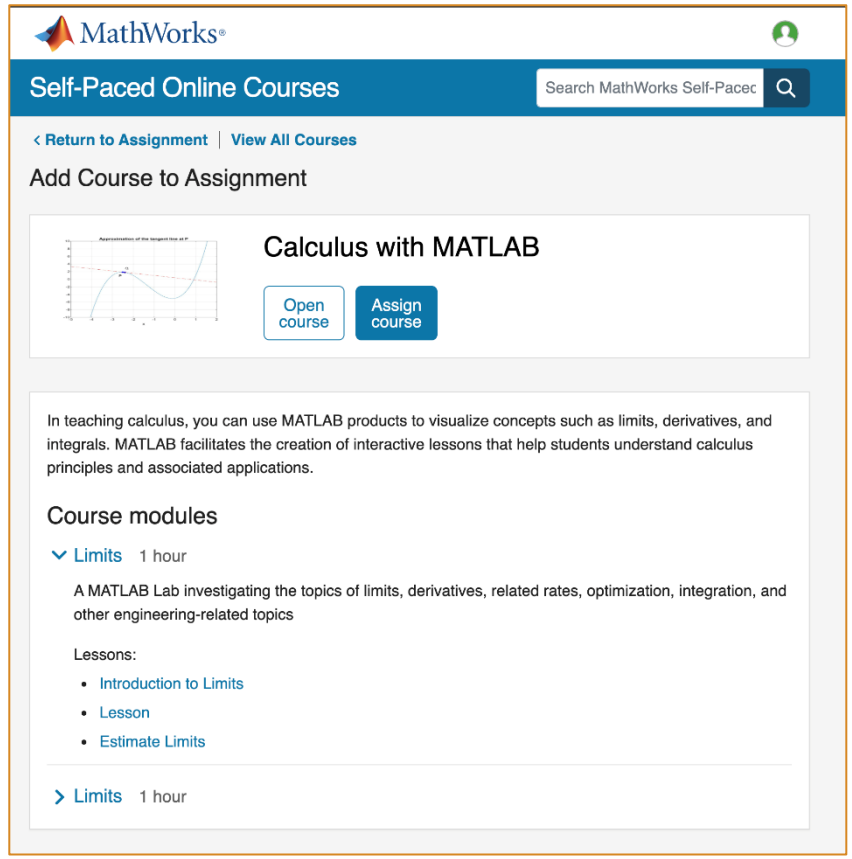
Posúdenie modelu v prostredí Simulink



Integrácia s LMS

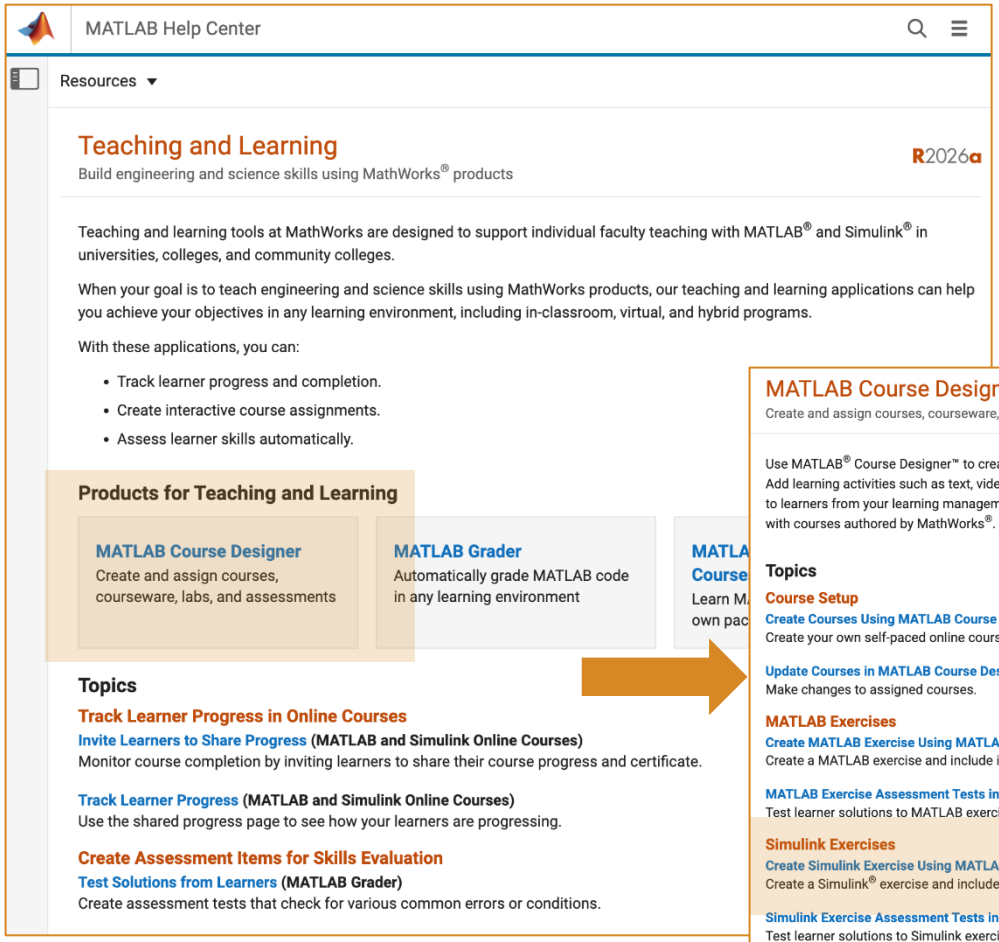


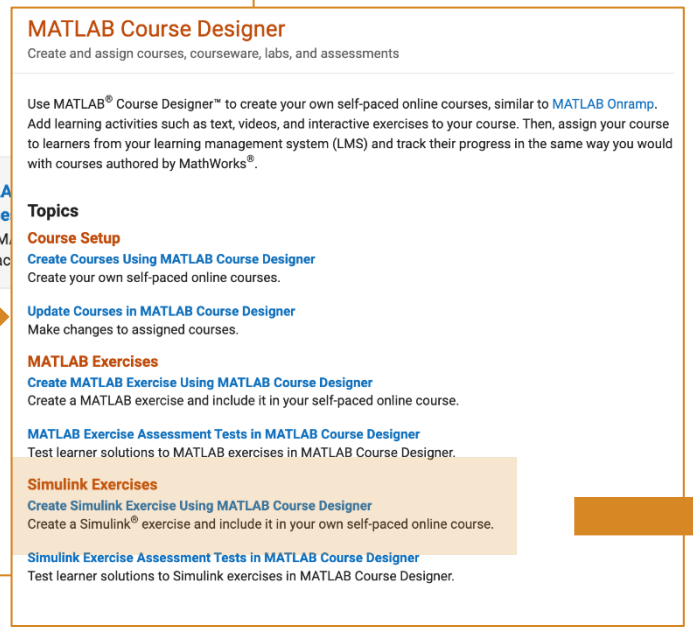


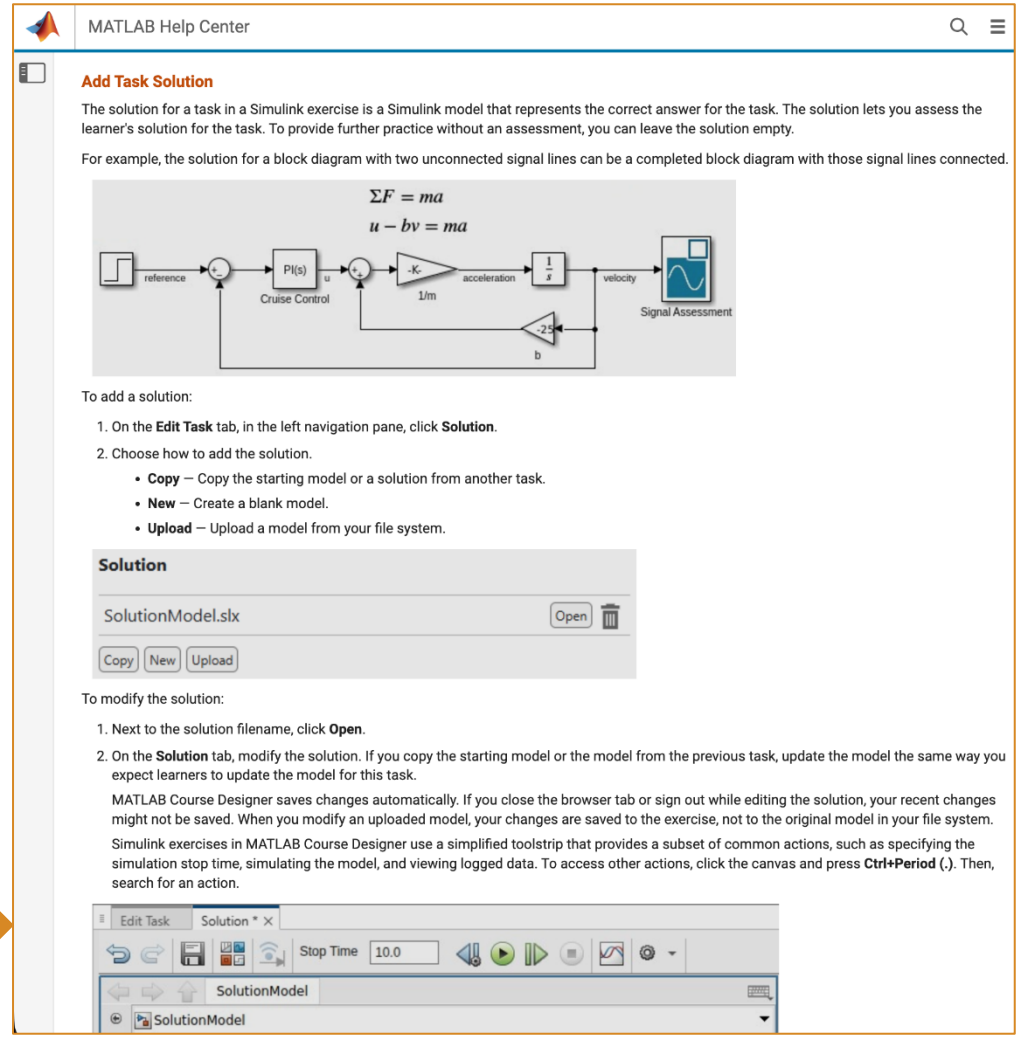


Učiteľ priraďuje študentom kurz prostredníctvom existujúcej aplikácie Online Courses App v LMS

Dokumentácia







Teaching and Learning

MATLAB Course Designer

Authoring Workflows: MATLAB & Simulink

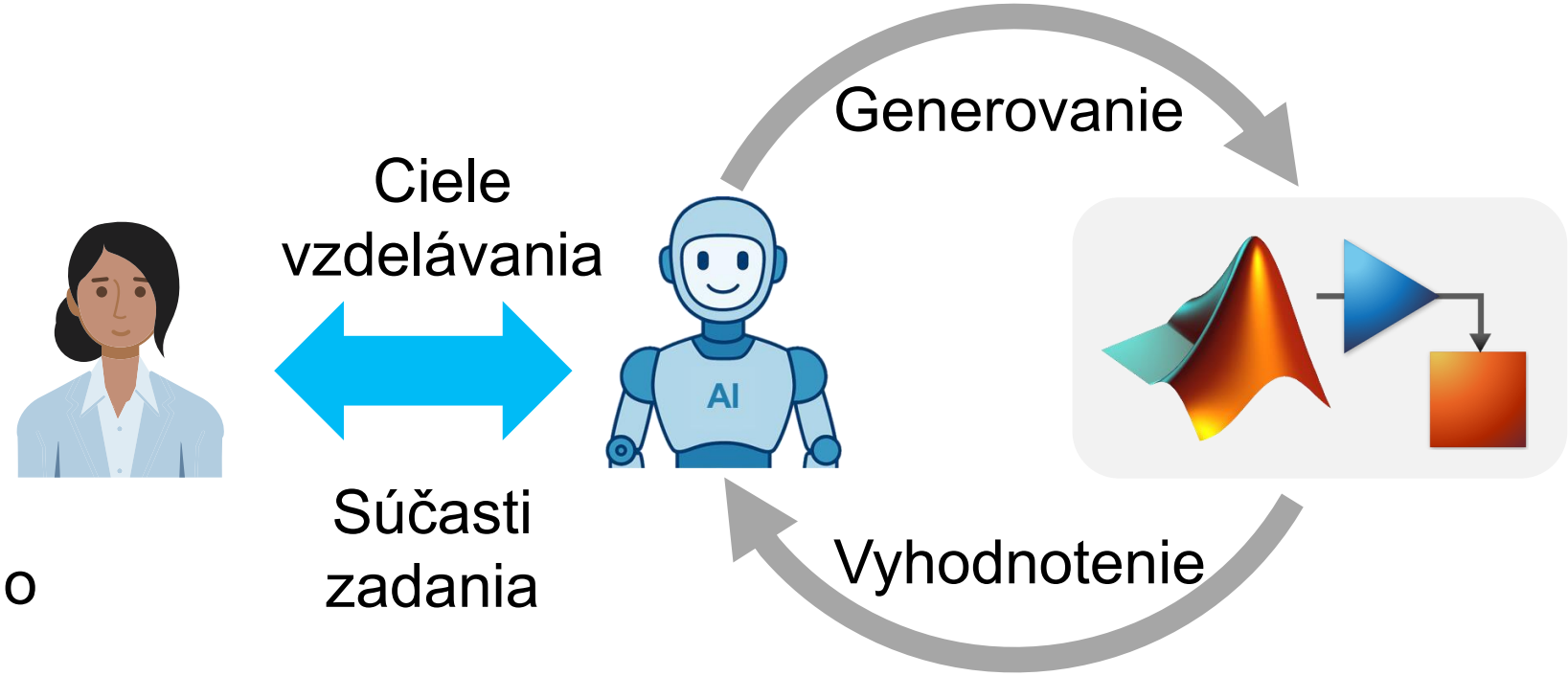
Vytvorenie zadania s testovaním

Úloha:

Ako môžem pomôcť učiteľom s tvorbou zadaní?

Riešenie:

Zapojte odborné znalosti do návrhu vášho hodnotenia pomocou Agentic AI.



***Cieľ**: Vytvorte celú sadu zadaní s hodnotením v pripravených na import do nástroja MATLAB Course Designer alebo MATLAB Grader.*

Ukážka: Vytvorenie zadania

```
codex exec demos/assessment-generation-for-matlab-grader

**MATLAB Grader Assessment Item Generation Complete**

Selected item: `Vector Transpose Function Item`
Purpose: Formative
Type: Function assessment item
Chosen for novice learners because it directly checks row
single transpose operation without adding unrelated MATLA

Generated files in codex-demo-output/vector_transpose_fur

- description.txt
- solution.m
- template.m
- function_call.m
- tests.m

Candidate ideas considered: `Identify
Column Forms` (Medium), `Normalize Mix
Easy candidate for the novice introduc

Verification: MATLAB executed the gene
successfully.
```

matlab_grader_vector_transpose_review.m

/Users/jalderso/blogs/matlab_grader_vector_transpose_review.m

description.txt

Vector Transpose Function Item

Write a MATLAB function that identifies whether an input vector is a row vector or a column vector, then uses a transpose operation to convert it to the opposite orientation. This formative assessment item focuses on recognizing vector shape and using transpose syntax to move between row and column forms.

Instructions:

1. Create a function named `vector_transpose_function_item` that accepts one numeric vector `v`.
2. Determine whether `v` is a row vector or a column vector.
3. Return `orientation` as the character vector `'row'` when `v` is a row vector, or `'column'` when `v` is a column vector.
4. Return `convertedVector` as `v` transposed to the opposite orientation.

Required function signature:

```
function [orientation, convertedVector] = vector_transpose_function_item(v)
```

Hints:

- `isrow` and `iscolumn` can help you inspect the orientation of a vector.
- The transpose operator changes a row vector into a column vector and a column vector into a row vector.
- You may assume `v` is a nonempty row or column vector with more than one element.

Before you submit:

```
codex exec demos/assessment-generation-for-matlab-grader

Verification: MATLAB executed the generated tests against the reference solution
successfully.

%% Test 1: identify a random row vector
v = randi([1, 30], 1, 6);
[orientation, ~] = vector_transpose_function_item(v);
assessVariableEqual('orientation', 'row');

%% Test 2: transpose a row vector into a column vector
v = randperm(19, 7) - 10;
[~, convertedVector] = vector_transpose_function_item(v);
assessVariableEqual('convertedVector', v');
```

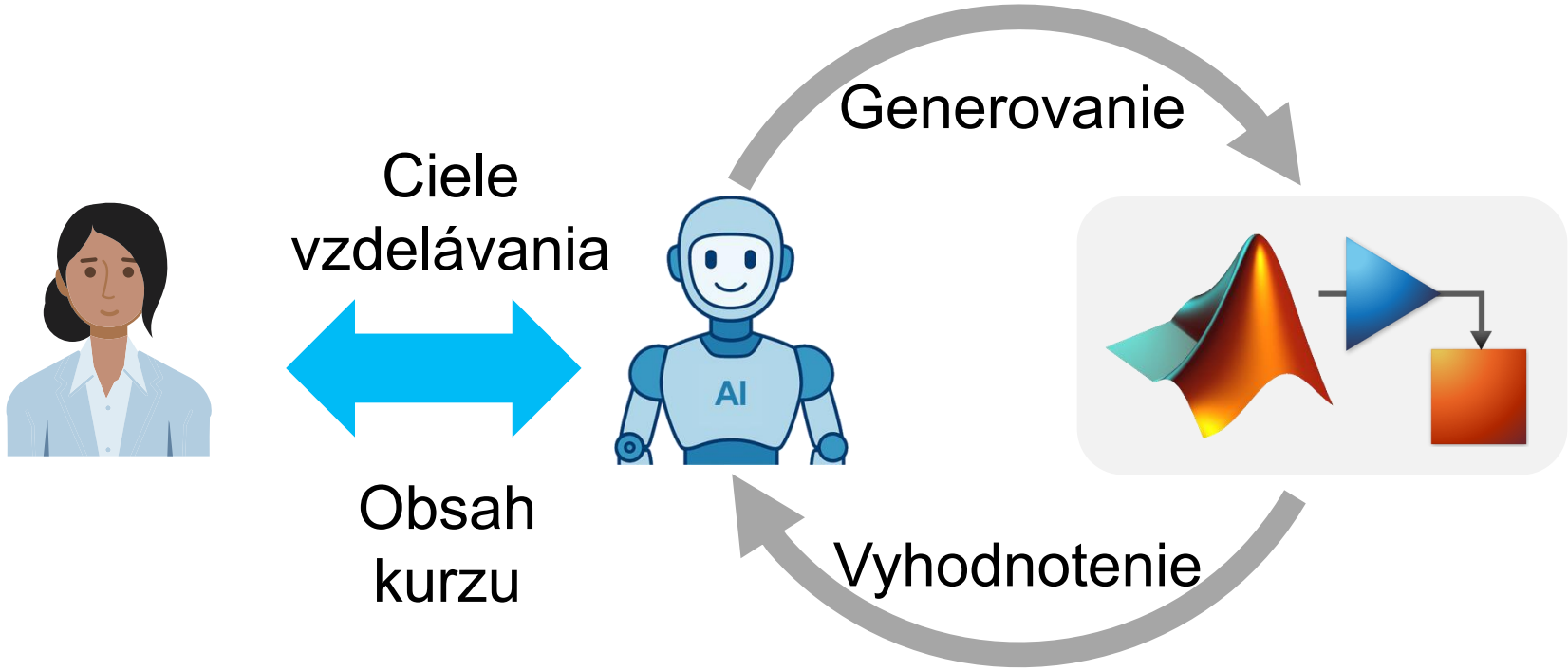
Vytvorenie kurzu

Úloha:

Zosúladenie vzdelávacích materiálov a hodnotenia

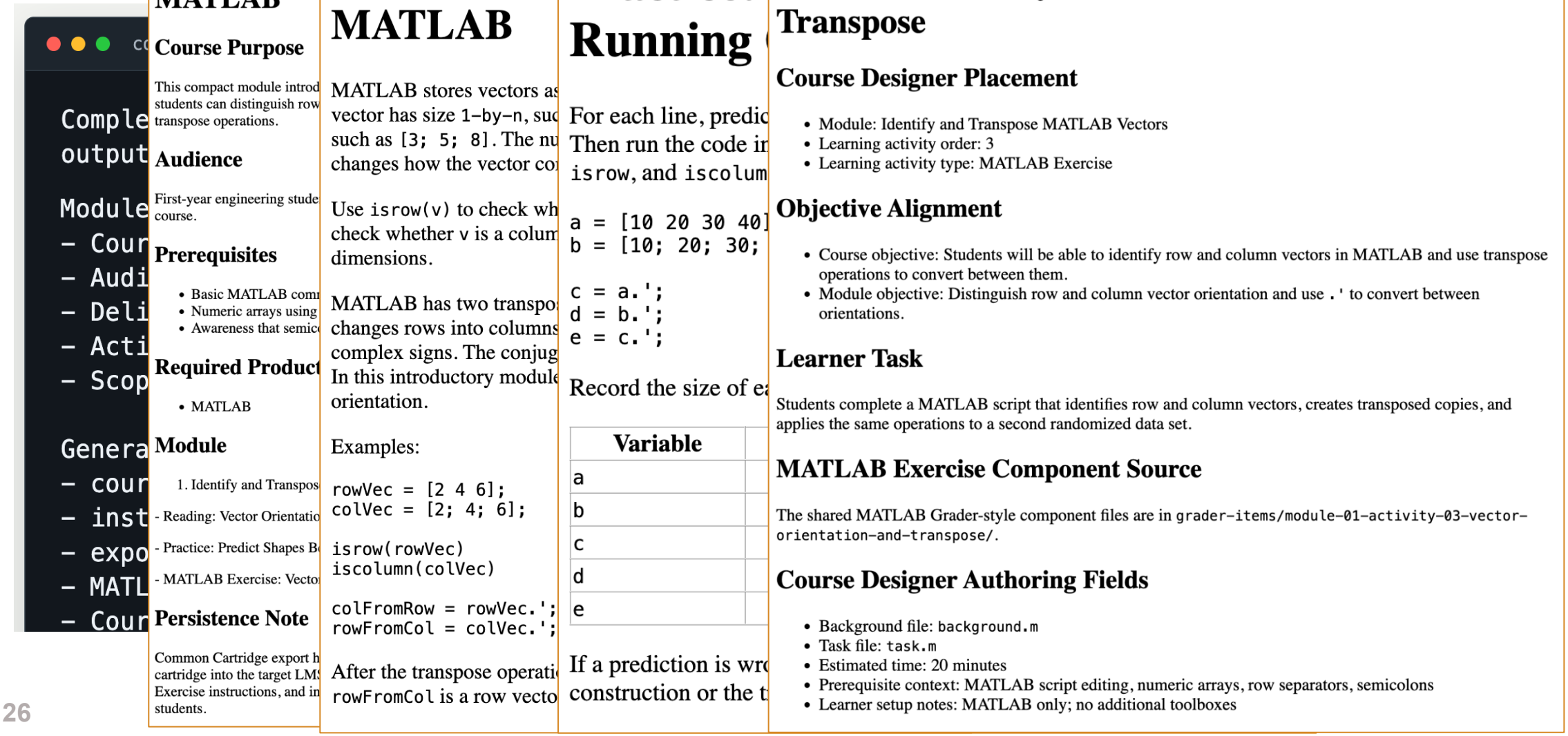
Riešenie:

Aplikácia pravidiel cieľov, postupov, usmernené cvičenia, hodnotenie a dôkladná kontrola.



***Cieľ**: Vytvorte si jednu lekciu alebo celý kurz s obsahom a hodnoteniami, pripravené na import do vášho LMS alebo MATLAB Course Designera*

Vytvorenie kurzu



Comple
output

Module
- Cour
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- MATL
- Cour

Vector Orient
MATLAB

Course Purpose

This compact module introd
students can distinguish row
transpose operations.

Audience

First-year engineering stude
course.

Prerequisites

- Basic MATLAB comm
- Numeric arrays using
- Awareness that semic

Required Product

- MATLAB

Module

1. Identify and Transpos

- Reading: Vector Orientatio

- Practice: Predict Shapes B

- MATLAB Exercise: Vecto

Persistence Note

Common Cartridge export h
cartridge into the target LMS
Exercise instructions, and in
students.

Reading: Ve
MATLAB

MATLAB stores vectors as
vector has size `1-by-n`, suc
such as `[3; 5; 8]`. The nu
changes how the vector co

Use `isrow(v)` to check wh
check whether `v` is a colum
dimensions.

MATLAB has two transpos
changes rows into columns
complex signs. The conjug
In this introductory module
orientation.

Examples:

```
rowVec = [2 4 6];
colVec = [2; 4; 6];

isrow(rowVec)
iscolumn(colVec)

colFromRow = rowVec.';
rowFromCol = colVec.';
```

After the transpose operati
`rowFromCol` is a row vecto

Practice:
Running

For each line, predic
Then run the code ir
`isrow`, and `iscolum`

```
a = [10 20 30 40]
b = [10; 20; 30;

c = a.';
d = b.';
e = c.';
```

Record the size of ea

Variable	
a	
b	
c	
d	
e	

If a prediction is wr
construction or the t

Module 01 Activity 03: Vector Orientation and Transpose

Course Designer Placement

- Module: Identify and Transpose MATLAB Vectors
- Learning activity order: 3
- Learning activity type: MATLAB Exercise

Objective Alignment

- Course objective: Students will be able to identify row and column vectors in MATLAB and use transpose operations to convert between them.
- Module objective: Distinguish row and column vector orientation and use `.'` to convert between orientations.

Learner Task

Students complete a MATLAB script that identifies row and column vectors, creates transposed copies, and applies the same operations to a second randomized data set.

MATLAB Exercise Component Source

The shared MATLAB Grader-style component files are in `grader-items/module-01-activity-03-vector-orientation-and-transpose/`.

Course Designer Authoring Fields

- Background file: `background.m`
- Task file: `task.m`
- Estimated time: 20 minutes
- Prerequisite context: MATLAB script editing, numeric arrays, row separators, semicolons
- Learner setup notes: MATLAB only; no additional toolboxes

AI učiteľ pre prostredia MATLAB a Simulink

Problem:

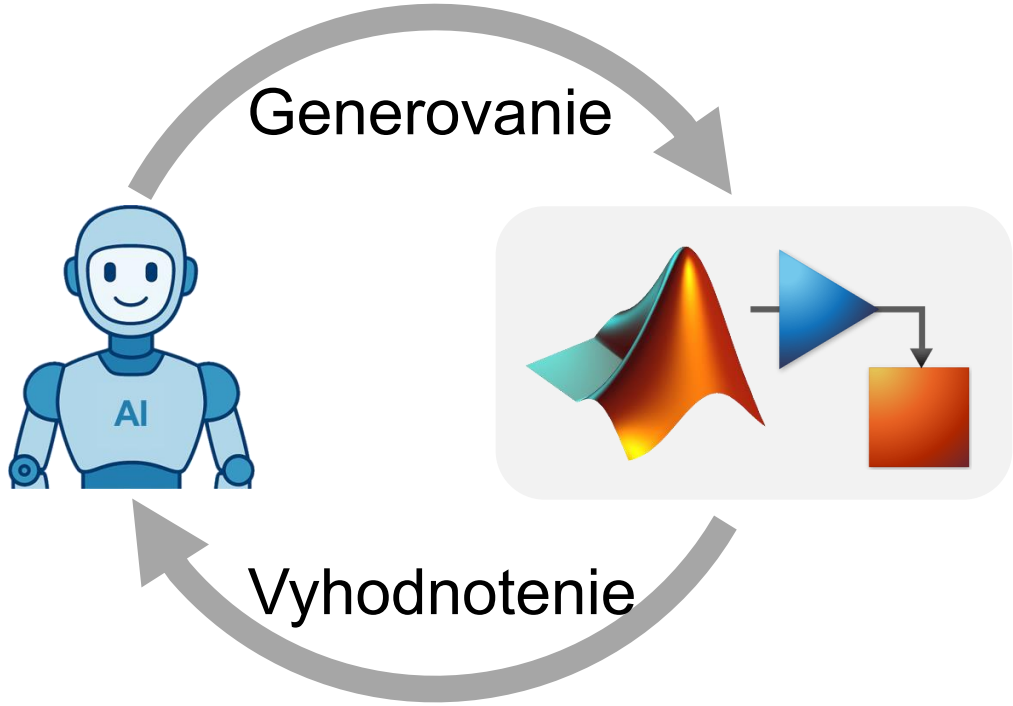
Ako si môžem samostatne precvičiť zručnosti?

Solution:

Použite agenta na vytvorenie personalizovaných materiálov, ktoré sú zosúladené so vzdelávacím plánom.

Plán učenia

Praktické aktivity



***Cieľ**: Vytvorte interaktívny vzdelávací plán s otázkami a viacerými odpoveďami, programovaním a tvorbou modelov – doplnený o hodnotenie a spätnú väzbu.*

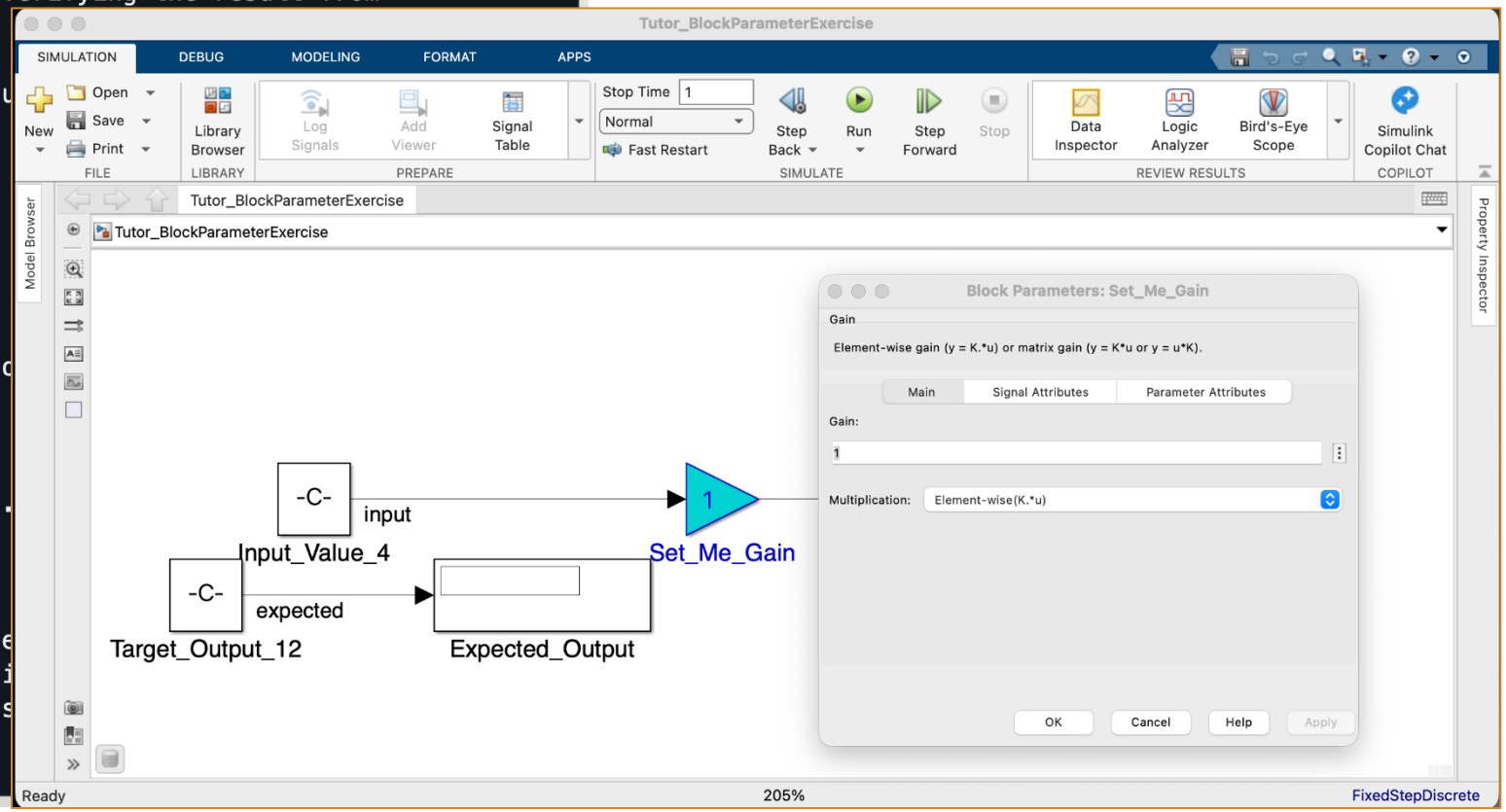
AI učiteľ pre MATLAB

```
codex exec demos/ai-tutoring

Learner:
I'm stuck on MATLAB vectors. I do not understand why [1 2 3]' and [1; 2; 3] seem
related.
Can you help me learn how to transpose vectors without just giving me homework answers?

Tutor:
Yes. I can help with the concept and with checking you
to graded homework,
I won't write the final submission for you, but I can
inspect your own attempt.

First diagnostic question: in MATLAB, what do you thin
here:
the numbers, the shape, or both?

Learner:
I think it changes the shape, but I don't know exactly

Tutor:
Good hypothesis. Let's collect MATLAB evidence instead

x = [1 2 3];
y = x';
z = [1; 2; 3];

size(x)
size(y)
size(z)
isequal(y,z)
```

```
Learner:
MATLAB says:

size(x) = 1     3
size(y) = 3     1
size(z) = 3     1
isequal(y,z) = 1

Tutor:
That evidence supports your hypothesis.

`[1 2 3]` is a row vector: 1 row, 3 columns.
The transpose operator `'` turns it into a column vector: 3 rows, 1 column.
`[1; 2; 3]` writes the same column vector directly, because semicolons separate rows.

So these two expressions produce the same shape and values:

[1 2 3]'
[1; 2; 3]

The MATLAB rule is: spaces or commas move across columns; semicolons move down rows;
transpose swaps rows and columns.
```

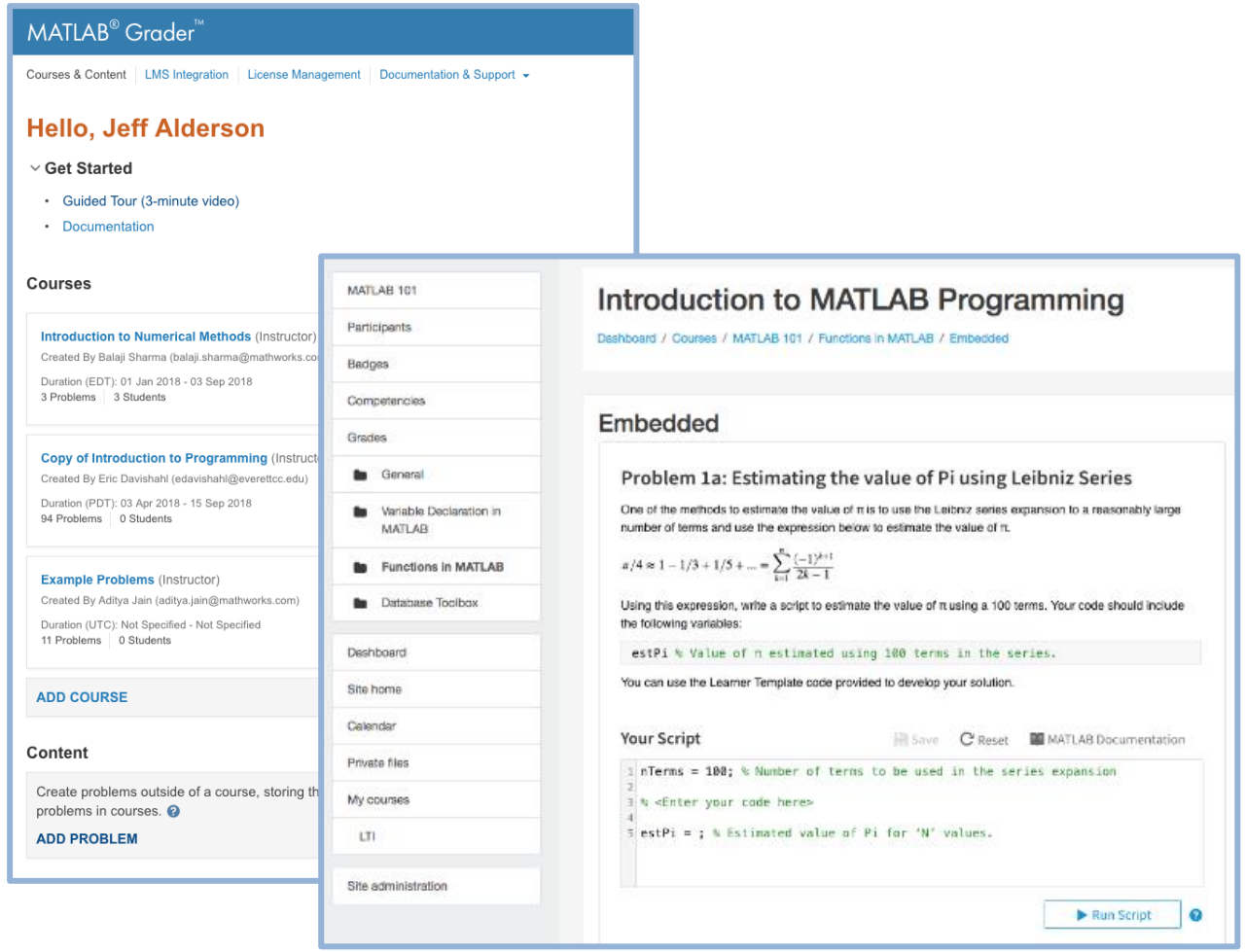
AI učiteľ pre Simulink

```
codex exec demos/ai-tutoring

Learner: I am in Simulink and I do not know how to set a block parameter.
Can you make a hands-on exercise?

Tutor: Goal: practice changing a block parameter and verifying the result from
the model, not from guesswork.

I opened Tutor_BlockParameterExercise.slx. The model u
Input_Value_4 -> Set_Me_Gain -> Observed_Output, with
beside it.

Expected evidence before you start:
- The input value is 4.
- The target gain is 3.
- The expected output is 12.
- The model starts with Set_Me_Gain.Gain = 1, so the c

Hands-on task:
1. Double-click the Set_Me_Gain block.
2. Change the Gain parameter from 1 to K_Tutor_Target.
3. Run the model.
4. Confirm Observed_Output matches Expected_Output.

Tutor: I also created Tutor_BlockParameterExercise_che
run the check. A pass means the Gain block parameter i
revision message means the parameter is still at the s
non-target value.
```



MATLAB Grader

- Interaktívna výuka
  - tvorba interaktívnych úloh a ich distribúcia študentom
  - zdieľanie úloh s ďalšími inštruktormi
- Automatizované hodnotenie úloh
  - okamžitá spätná väzba
  - analýza úspešnosti (študenta, skupiny)
- Možnosť integrácie s Moodle
  - alebo iným LMS
- Pre učiteľov sú pripravené úlohy



MATLAB Grader – pripravené úlohy

Getting Started with MATLAB Grader
13 problems

Calculus I
Created By: MathWorks
10 problems

Statistics
Created By: MathWorks
15 problems

Electric Circuits
Created By: MathWorks
16 problems

Digital Signal Processing
Created By: MathWorks
10 problems

System Dynamics and Control
Created By: MathWorks
10 problems

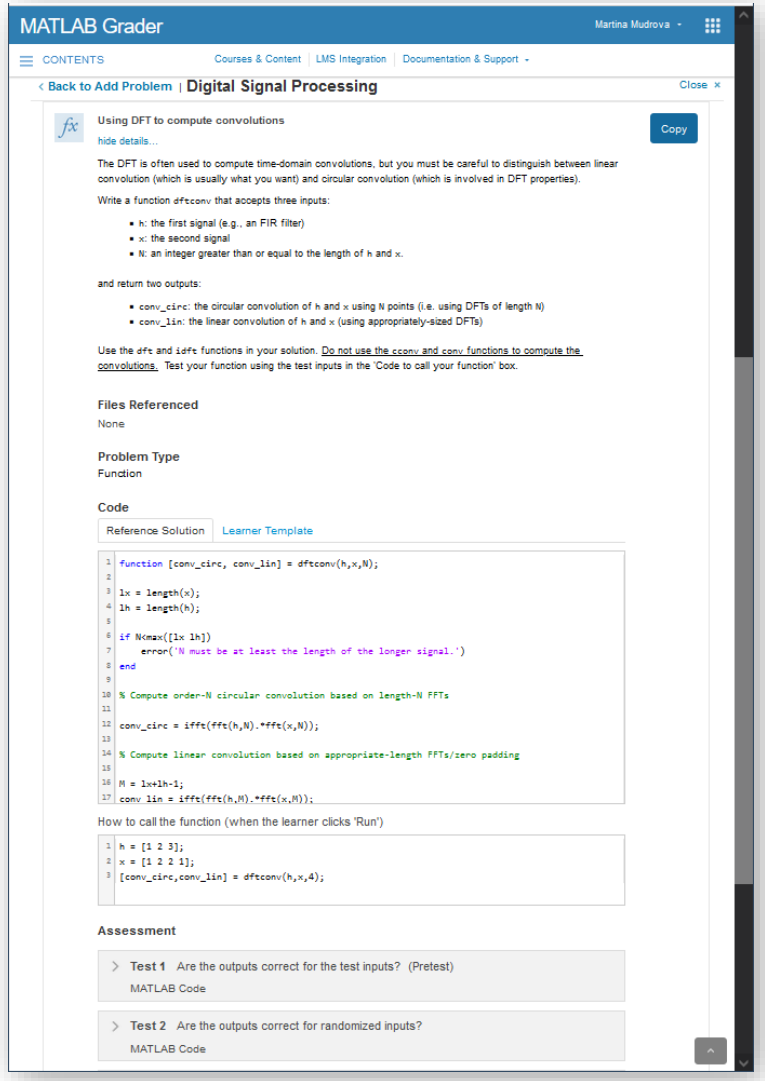
Dynamics
Created By: MathWorks
10 problems

Introduction to Programming
Created By: Eric Davishahl
111 problems

Calculus II
Created By: MathWorks
10 problems

Numerical Methods
Created By: MathWorks
10 problems

Symbolic Math Toolbox
Created By: MathWorks
10 problems



Pre prístup k pripraveným úlohám nám napíšte na studnicka@humusoft.cz

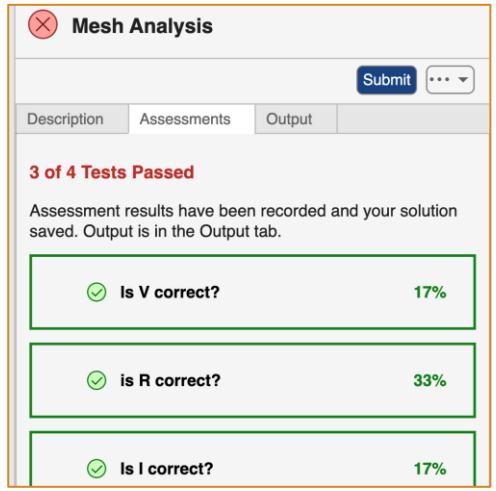
https://www.mathworks.com/products/matlab-grader/assessment-content.html

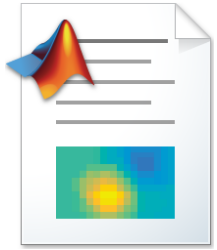
Podpora vzdelávacieho procesu

Vzdelávacie materiály

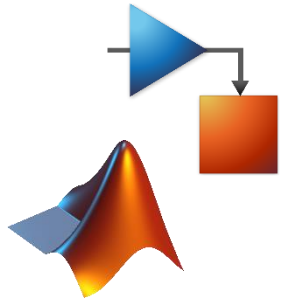
Praktické projekty

Automatické hodnotenie





Self-Paced Online Courses



MATLAB Course Designer

MATLAB Grader

Ďakujem za pozornosť