

Autograded Assessments with MATLAB Grader- Q&A

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What is an "LMS"? How is an LMS different than MATLAB Grader?

LMS is an acronym for Learning Management System. Common LMS platforms you may use include Moodle, Canvas, Blackboard, Ilias, etc.. MATLAB Grader is a cloud-based assessment tool for autograding MATLAB code. MATLAB Grader can be embedded into your LMS using learning tool interoperability (LTI) standards. For more information on integrating MATLAB Grader into your LMS, please refer to this article: <https://www.mathworks.com/matlabcentral/answers/516139-reusing-content-from-a-matlab-grader-course-in-a-lms-course>

Can MATLAB Grader be used to create individualized problems, e.g. create several versions of the same problem with different parameters for different students?

Yes, please refer to this article for explanation for how randomization is supported in MATLAB Grader: <https://www.mathworks.com/matlabcentral/answers/525780-randomization-in-matlab-grader>

How is MATLAB Grader Licensed? Do students require a separate license? Are (student) licenses for all toolboxes required that are chosen as 'Products'? Does my license include access to MATLAB Grader, or to integrate MATLAB Grader in my LMS?

MATLAB Grader is available at no cost for instructors that have access to a MATLAB license that is current under maintenance, including the Campus-Wide License. Students that access courses created by licensed instructors do not require a separate license. All products available on the Campus-Wide License are available within MATLAB Grader, but the specific products used in each course must be selected by the instructor at the time the course is created. MATLAB Grader can be integrated into Learning Management Systems like Canvas, Blackboard, and Moodle, however this integration requires a separate license. Contact your MathWorks representative if you would like to begin the process of integrating MATLAB Grader into your LMS. More information about MATLAB Grader licensing is available on the product page here: <https://www.mathworks.com/products/matlab-grader.html>

Is it possible to automatically grade Simulink/Simscape models?

MATLAB Grader was designed to automatically grade MATLAB code and not Simulink models interactively. While Simulink models can be accessed through the use of the "sim" command in MATLAB Grader, those models can not be edited or accessed interactively through the GUI. Also, MATLAB Grader has a strict execution time limit of 60 seconds (which includes running the reference solution, learner solution, and all assessment tests). Due to the way that the "sim" command is currently supported, complex models, or models with long runtimes are not supported. Please contact your account representative for assistance if you are interested in incorporating Simulink models into your automated assessments in MATLAB Grader.

Is there way for this platform to check if students copied code from each other, i.e. to measure similarity of solutions or enforce plagiarism detection?

MATLAB Grader currently does not support built-in similarity scoring. However, you can use the assignment-level report in MATLAB Grader to export all student solutions to a file to use in your preferred similarity scoring engine. For more information please refer to this article: <https://www.mathworks.com/matlabcentral/answers/421879-how-does-matlab-grader-handle-cheating>

What is the meaning of "Group" in "Collection". How am I supposed to use Groups?

Collections and Groups are helpful to create and organize content for instructors to collaborate before they create the course with students. A single Collection can contain one or more Groups that allow for organization by topic, time period, homework, exams, or any other way an instructor might like to organize individual problems. For more information on using collections and groups, please refer to the documentation: <https://www.mathworks.com/help/matlabgrader/create-content.html>

When adding a new problem to an existing course or collection, I do not see the problem collections provided by MathWorks, I only see blank problem and Getting Started with MATLAB grader. What could be the problem?

MATLAB Grader problem collections are available to verified instructors only. Instructors can request access through Customer Support or their assigned Customer Success Engineer or Account Representative. More information about our problem collections is available here: <https://www.mathworks.com/products/matlab-grader/assessment-content.html>

How do I add links (URLs) to the problem description or other editable text areas?

MATLAB Grader uses a rich text editor which allows for the inclusion of text, images, inline code and links (URLs). More information on how to use the MATLAB Grader editor is available here: <https://www.mathworks.com/help/matlabgrader/ug/create-script-based-problems.html>

How do students visualize the workspace in MATLAB Grader, like they might do in MATLAB or MATLAB Online?

When running a solution in MATLAB Grader, the learner can make use of the "who" and "whos" commands to get a list of variables in their workspace at any time, and as they iterate on their solution. The complete output of their script is available to them when running their solutions. Additionally, a student might prefer to iterate on their solution in MATLAB or MATLAB Online before pasting their solution into MATLAB Grader when it is ready to submit. That approach will also allow them to make use of the full workspace, debugger, and other MATLAB features to iterate on their solution without counting against any limits on submission attempts.

Is it possible to make a copy of whole existing collection (like Introduction to Programming), or I should copy problem-by-problem?

Currently, we support the copying of an entire Course created by the instructor, but not a Collection provided by MathWorks. You can choose individual problems within problem collections to use within your course or collection as-is, or modify before using them. We are currently working on enhancements to support other ways to copy and use one or more problems at a time within MATLAB Grader.

Where can I find more information on how to create assessments for MATLAB Grader problems?

You can find the complete documentation on MATLAB Grader assessments here:
<https://www.mathworks.com/help/matlabgrader/ug/testing-learner-solutions.html>

How do students know the names of variables that were made available to them in reference files? How can the student view the contents of files that were added to reference files?

A best practice is to include lines of code that call the reference files or functions the instructor wants to run in order to set up the students' workspace, and then lock those lines of code so that they are not editable. Then the student can use the "who" or "whos" commands to explore the contents of the workspace. Additionally, the files themselves will be available to the student to interact with in their solution. It is common to call out the names of the files and how you want the student to interact with them in the problem description itself.

Can you enroll multiple students into a MATLAB Grader course without adding them one at a time?

Copying and pasting multiple email addresses from Microsoft Excel works fairly well, as MATLAB Grader supports adding a comma separated list of email addresses to a course at one time. LMS Integrations also solves the issue of student enrollment, as all of the course roster and student management is handled by that platform.

Some problems could have another correct solution different from the reference one. How will MATLAB Grader respond?

MATLAB Grader assessments can be used to check that the contents of variables in the workspace after the solution is run are equivalent to the reference solution, and within optional tolerances that the instructor can set. That means that even though the student may use a different algorithm or approach to solve the problem, they may still arrive at the same result. If it is important that the student solve the problem in the way the instructor intended, coach the student through the steps you want to see in the problem description, provide code scaffolding with intermediate steps, comments and predefined variable names in the learner template. That way, you can check the values of the intermediate step variables, as well as the presence (or absence) of specific functions used in the learner solution.

How do I integrate MATLAB Grader with my school's LMS? We use Blackboard, Moodle, Canvas, or another homegrown system that supports the LTI standards.

Please contact your MathWorks account representative to get started with integrating MATLAB Grader into your LMS. More information on support for LTI integration with common LMS platforms is available in our documentation here:
<https://www.mathworks.com/help/matlabgrader/lms-integration.html>

Do you have tutorials and training for instructors on how to include MATLAB Grader in a course?

We currently have a 2-hour Teaching with MATLAB self-paced training course available to instructors, which includes a section on adding MATLAB Grader to your course.
<https://www.mathworks.com/learn/teaching-with-matlab.html>

How is MATLAB Grader used for timed exercises? Can I restrict access to MATLAB Grader problems using my LMS? Can I restrict access to certain MATLAB Grader problems for specific groups of students?

MATLAB Grader supports the use of problems for quizzes and exams, including the timed release of problems to students after a specific date and time. However, if you wish to restrict the access of MATLAB Grader problems to a strict examination window (including the removal of access to the problems after the examination window has expired) you should use MATLAB Grader in the context of your LMS platform. Typically, the LMS will have many more features used in the conditional/timed access to course content, including restricting access to specific sets of MATLAB Grader problems to student cohorts and groups.

Is it possible to grade computation time/complexity?

MATLAB Grader allows instructors to see the size of a single students' solution relative to other student solutions for that problem. This is available in the Solution Map, with additional features for analyzing student solutions available only in Learner Analytics. More information on Learner Analytics is available here:
<https://mathworks.com/help/matlabgrader/ug/learner-analytics.html>

Additionally, since MATLAB Grader is a cloud-based application, execution times for the same solution may vary, and may not be a good measure of coding efficiency.

How do you ensure security and authentication?

When accessing MATLAB Grader at grader.mathworks.com, all users are logging in through an HTTPS session with a MathWorks account. MathWorks accounts can be enabled for 2-factor authentication. For more information about MathWorks account security, please refer to this documentation:

https://www.mathworks.com/mw_account/two_step_verification/frequently-asked-questions.html

When integrating MATLAB Grader into your LMS, the LTI standards are used. LTI includes its own security model using OAuth standards, and the authentication to MATLAB Grader is controlled by your LMS and configured by your LMS Administrator. For more information about the information we do and do not collect as part of an LTI session, please refer to this article: <https://www.mathworks.com/matlabcentral/discussions/distance-learning/132301-what-information-is-sent-to-matlab-grader-when-connected-to-my-lms>