Read Me

Content Description

With Bytes and Beats, students will use MATLAB®, the programming platform used by scientists and engineers, to turn if-statements, for-loops, and functions into rhythms, melodies, and harmonies. Working with friends, they will compose and visualize their own music and invent their own symphonic creations.

This material contains interactive MATLAB Live Scripts to assist instructors in teaching computer programming and musical concepts. They can be leveraged as demonstrations, activities, or interactive assignments.

How to Use this Content

Modules are numbered to show a recommended flow, but do not necessarily need to be completed sequentially. You may choose to complete whichever modules fit the experience level of your students.

This means that modules can be leveraged as:

- Individual lessons/activities
- A combination of modules, either in order or mixed and matched
- A week-long course, consisting of a few modules per day:

Day 1	Day 2	Day 3	Day 4
1. *Sound and Music*	5. *Shopping for a Musical Party*	9. *Understanding Loops*	13. *Importing and Editing Sounds*
2. *What is Programming?*	6. *Practice with Indexing*	10. *Tunable Parameters and "If" Statements*	14. *Working with Sound Files*
3. *Introduction to MATLAB*	7. *Vectors, Variables, and Functions*	11. *Figures and Callback Functions*	15. *Creating a Melody*
4. *Using Variables*	8. *Using Functions to Create Music*	12. *Creating a Virtual Theremin*	16. *Music Mixer App and Performance*

Technical Requirements

There are no prerequisites for these modules, but instructors and students can use MATLAB Onramp or Learn to Code (*for younger students*) as a resource to become familiar with Live Scripts and MATLAB syntax.

Students will need laptops or Chromebooks with access to the Internet to use MATLAB® Online™. MATLAB Online provides access to MATLAB and Simulink through a web browser, eliminating the need to install the entire application on a device.

For the best overall experience, Google Chrome® is recommended to access MATLAB Online.

For more information about MATLAB Online, please visit:

https://www.mathworks.com/products/matlab-online.html

Curriculum Components

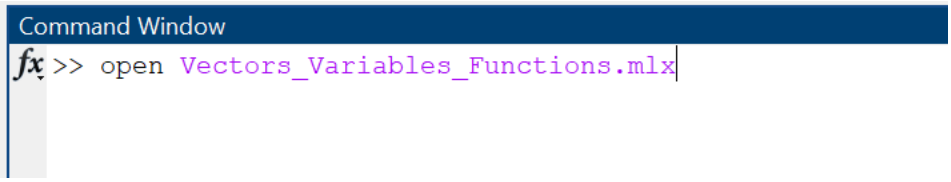
Instructor Guides

Each module has its own Instructor Guide in the form of a Live Script or Word document. These contain all the background information, course preparation, and lesson plans for the activities to cover with the students. Be sure to read them carefully as they contain the basic information you need to teach each module successfully.

Tip: To effectively navigate the Instructor Guides, you can make use of the Table of Contents at the top.

Student Live Scripts

While you use the Instructor Guides to direct the modules, students will be opening Live Scripts through the File Explorer or via the command line, as shown below:



They will follow along with these and are not given a set of Instructor Guides.

Student Worksheets and Handouts

Included are worksheets and handouts that students fill out to reinforce concepts, the modules indicate when to print/distribute each worksheet. Handouts contain a list of vocabulary and common MATLAB commands the students need in the course. Encourage the students to refer to the handouts throughout the course. The 'Materials' section in each activity lists the Worksheets and/or Handouts required for that activity.

What is a “Live Script”?

Within this content, MATLAB Live Scripts (".MLX") are employed, which are interactive documents that combine MATLAB code with formatted text, equations, and images in a single environment called the Live Editor. Both “.M” files and “.MLX” files will execute the written code the same, but the Live Scripts are meant to be interacted with as an educational or visual tool.

https://www.mathworks.com/help/matlab/matlab_prog/what-is-a-live-script-or-function.html

https://www.mathworks.com/help/matlab/live-scripts-and-functions.html

Note: *Modules are also available in Word document format*

Installing the Bytes and Beats Toolbox and Materials

(These instructions are for both instructors and students)

Open a web browser and go to the following web address to access a link to download the curriculum:

https://www.mathworks.com/academia/courseware/bytes-and-beats.html

Open a web browser and go to the following web address to access MATLAB Online:
https://matlab.mathworks.com/

Once the curriculum zip file has been downloaded, open the web browser (Google Chrome® or Microsoft Edge®) and go to:

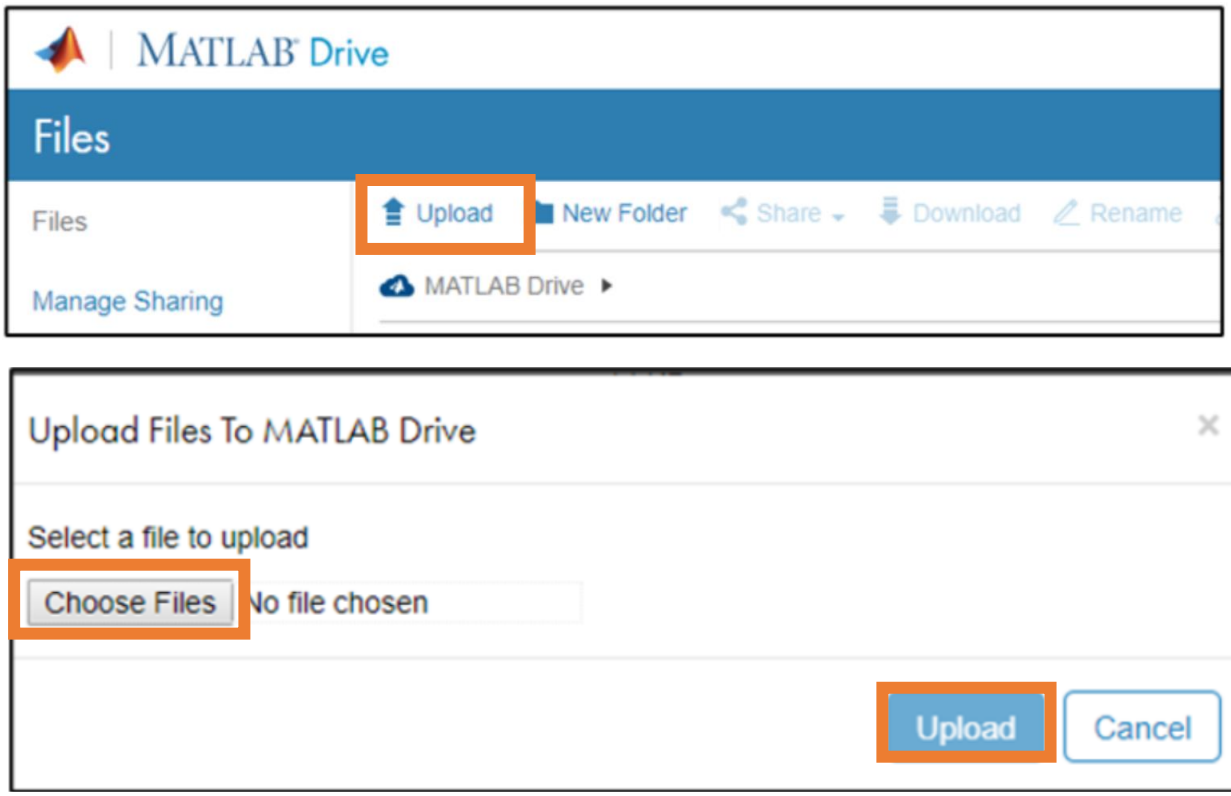
https://drive.matlab.com

You must use your MathWorks User ID and Password to login and use MATLAB.

If you need to create an account, you can do so at the following link:

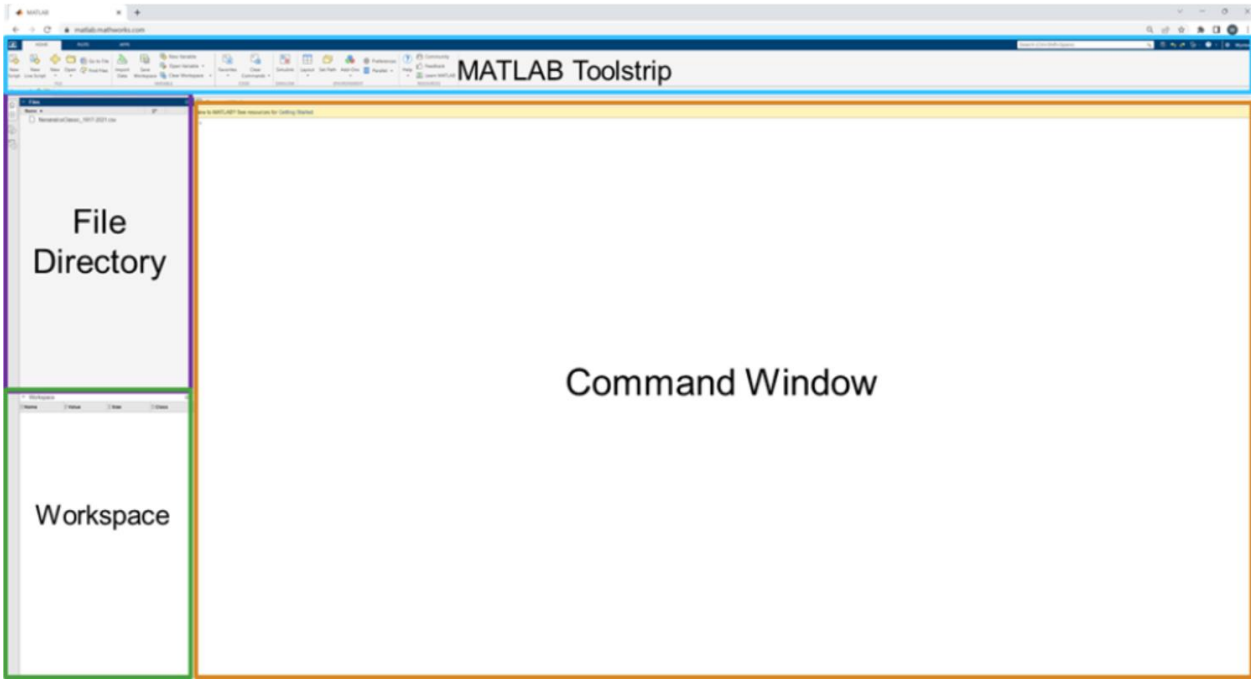
https://www.mathworks.com/mwaccount/account/create?uri=

Upload all the files within the zip folder to MATLAB® Drive™:



Once this process is completed, go to MATLAB Online from your web browser:

https://matlab.mathworks.com/



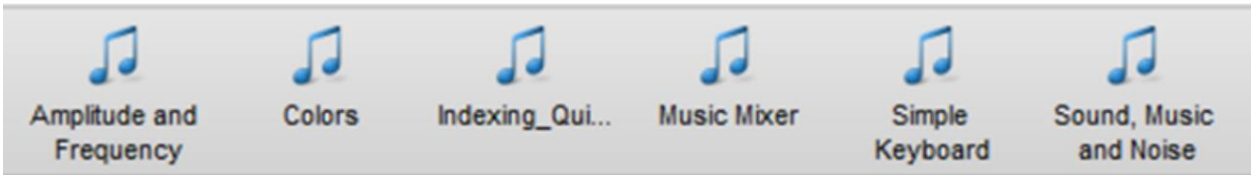
Within the Command Window, next to the >> symbol, type the following:

>> setupBnB

This will start installing the course toolbox and the audio files.

Note: This could take several minutes to complete. You only need to run 'setupBnB.m' once to install the course toolbox and the audio files.

Navigate to the **APPS** tab in MATLAB Online. Once you see all six Apps below, the toolbox has installed successfully:



From there, you can get started by opening the modules within the 'instructor_guides' folder.

The instructions inside these will guide you through the exercises and activities.