**BEES1041 Exploring the Natural World**

Computing Exercises

Jupyter notebooks on Google Collab

Each week in BEES1041 there a computing exercise, designed to get you thinking about how data can be used to explore the natural world. Some of the exercises require you to use software installed on your computers, such as Microsoft Excel or Quantum GIS (QGIS). Most of the exercises will also have a coding component, which will require you to learn some R and Python. These coding exercises will use Jupyter notebooks, which are a user-friendly way to run code. Jupyter notebooks are organised into cells, which contain either text or code. Text cells are formatted using *Markdown* which create nice looking documents. Code cells are written in the chosen programming language and can be run to create outputs like calculations or graphs, which display in the notebook. You will use Jupyter notebooks through Google Colab, which is online, and doesn't require you to install any software. This document contains instructions for how to get the Jupyter notebooks, and how to use them on Colab.

1. Login into Moodle, go to the BEES1041 page, the relevant week, and click on the computer exercise link (or click the link in the timetable). Carefully read the exercise, do the activities, and answer the quiz questions. When there is a coding activity there will be a link to download a Jupyter notebook, which you should save on your computer. These will be files with an **ipynb** extension. Some exercises will have data files to download as well.

2. Login to Google Colab at https://colab.google/. If you already have a google account, then you can click **Open Colab** and then **Sign in**. If you don't have a Google account, you will need to get one by clicking **Sign Up**.

3. Upload the Jupyter notebook from the menu by selecting File > Upload Notebook and browsing to the notebook file with the ipynb extension. When you have finished running code or making edits you can download the notebook using the menu File > Download > Download .ipynb

4. Jupyter notebooks have text and code cells. If the code cells create output when they are run, the output will be printed directly below the code. You can run code cells by clicking the play button ⊙ on the cell or by using the options under the Runtime menu.
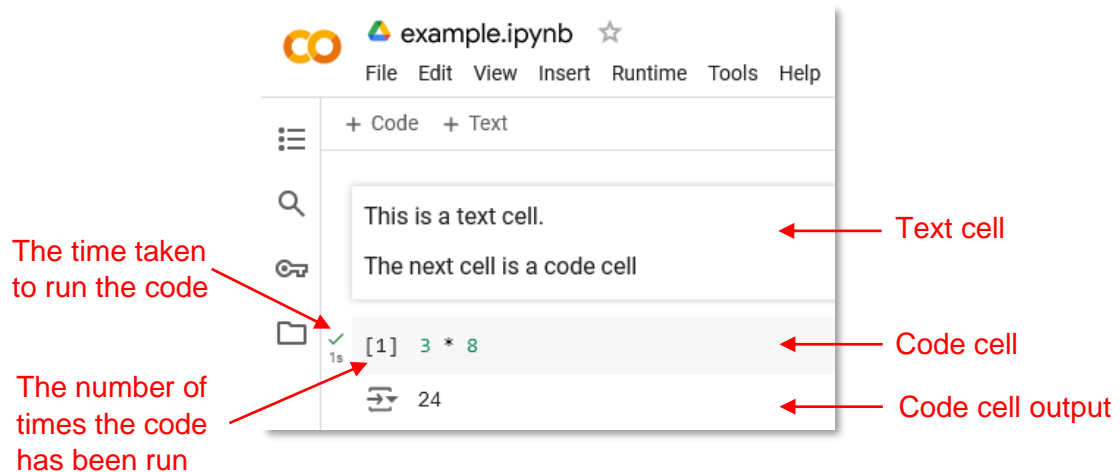
5. You can run R or python code in Jupyter notebooks. You can view or change this by using the menu Runtime > Change runtime type.

6. Sometimes you will have to upload data files so that your code can read and analyse the data. You can do this by clicking on Files and then Upload to session storage.
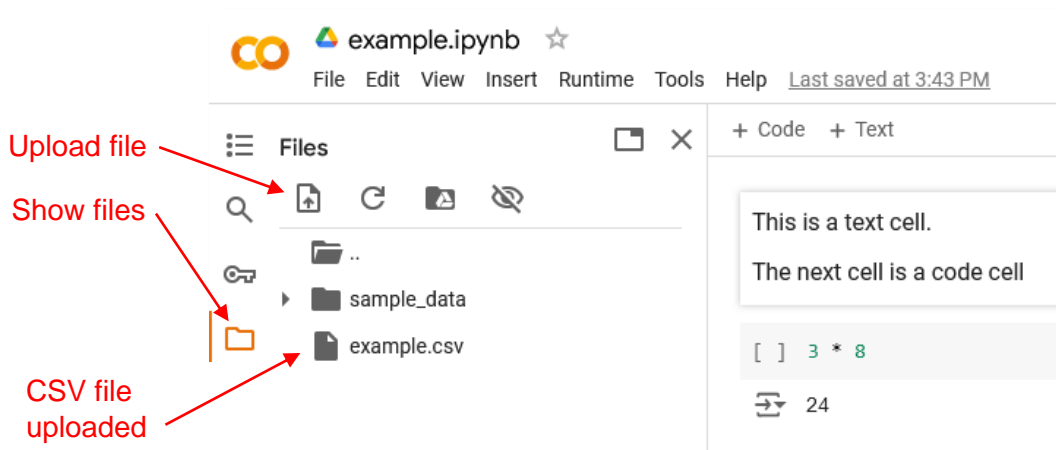
7. The notebooks you download from Moodle will have instructions for you to follow, and code for you to run. Read carefully, as they might ask you to edit some of the code. You will need to run the code cells to see the output. Remember to stay logged into Moodle, as there may be some Moodle quiz questions to answer about what you learn from the notebook.