
pyTecanEx program version 1 – User Guide

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Introduction and Motivation

This Python-based program aims to assist all users who obtain results from the Tecan microplate reader. Generally, users who are also scientists usually design experiments using a 96-well plate in a column-based manner, as shown in Figure 1 below. However, Tecan's microplate reader provides a row-based result. Therefore, additional data organization is required before users can analyze and interpret their data. Some may argue that the users may alter the experimental design corresponding to the microplate reader style, which can solve the problem quickly—this argument is solid. However, this solution is only suitable for an experiment that requires fewer test solutions. For example, like IC₅₀ (half inhibitory concentration) determination, MIC (minimum inhibition concentration), or MBC (minimum bactericidal concentration), these assays require more concentration of the compound of interest. Therefore, the adopted experimental design in a row-based manner is unsuitable since the 96-well plate has more columns, 12, than rows, 8 (as shown in Figure 1 below), and this is the reason why this program was created to assist users in Tecan's reader result data organization and analysis.

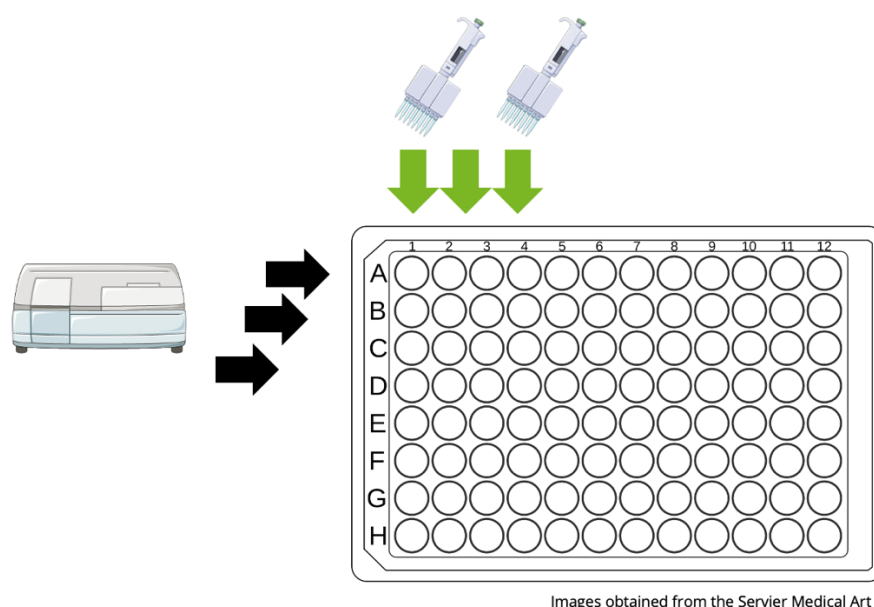


Figure 1. Row- and column-based design used by most users and Tecan's microplate reader.

An essential step before analysis

As mentioned above, the users can use a standard column-based design in their experiment. However, the users should use the **last column** for **control**. In this way, pyTecanEx will organize the users' results obtained from Tecan's microplate reader machine and calculate the percentage activity and percentage inhibition corresponding to the control. The following section provides an example of how to use the program effectively.

Example

Experimental assay:

- IC50 determination of an antibiotic drug against bacteria

Experimental explanation:

- Eleven antibiotic drug concentrations were co-cultivated with bacteria at 37 degrees for 15 hours. The bacterial growth curve was monitored every hour at 600 nm. The obtained bacterial growth from eleven concentrations of antibiotic drugs was compared to control bacterial growth without the drug in the last column. Therefore, there were twelve test samples in total (columns 1 to 12), as shown in Figure 2.

Pipette scheme:

- Eleven contractions of an antibiotic drug were added to columns 1 to 11, and the control, without antibiotics, was added to column 12.
- Each antibiotic concentration was repeated three times in rows A to C.
- The pipette scheme was provided in Figure 2 below.

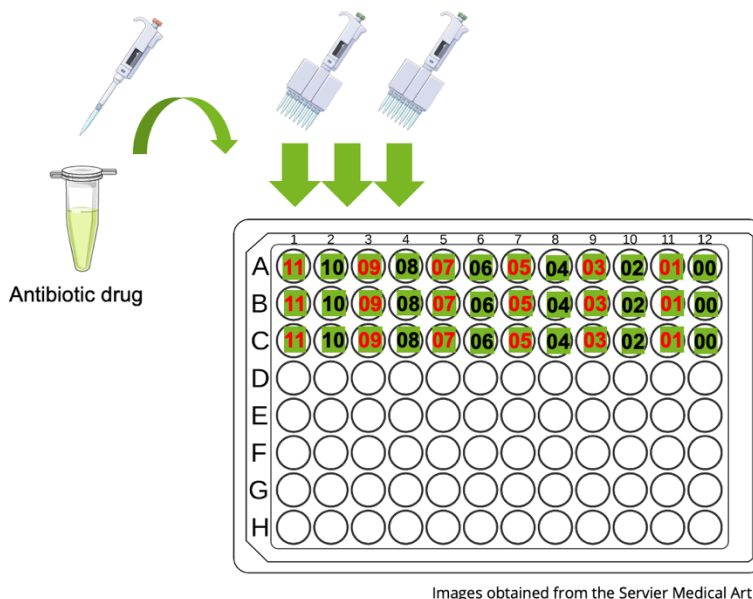


Figure 2. Experimental design and pipette scheme of IC50 determination of antibiotic drug against bacteria.

Prepared obtained data before using the pyTecanEx program:

1. Only the absorbance value should be collected from the Tecan microplate reader data file, as shown in Figure 3, highlighted in green.
2. The collected data should be pasted into a new Excel file and saved.
3. In a new Excel file, new cycle times must be added manually above the collected data from step 2, as highlighted in orange.

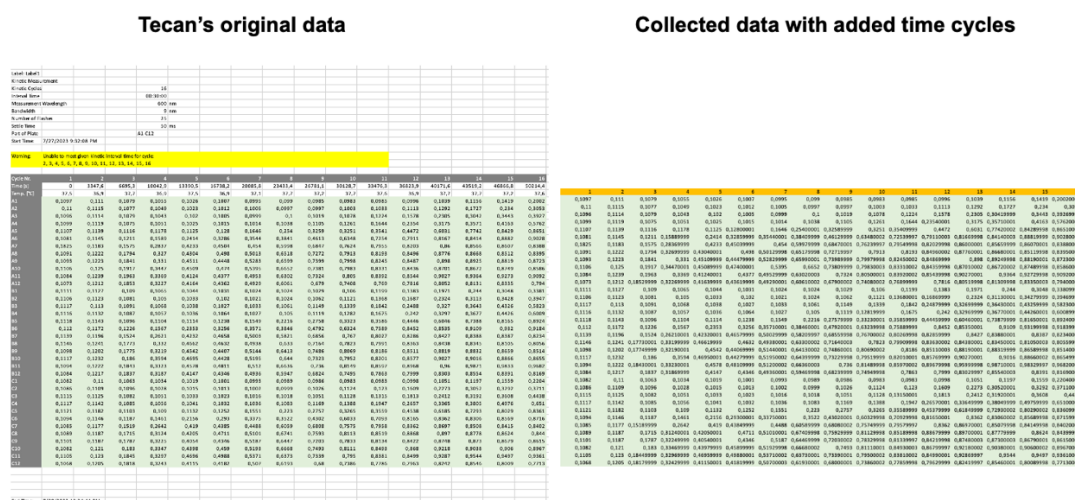


Figure 3. Data collection from Tecan's original data file and saved new data file with manually added cycle times.

Run the program:

- There are seven simple steps to run the program.
 1. Double-click the pyTecanEx icon on your desktop, as shown in Figure 4. Alternatively, the users can call the program using a terminal using the code here (python pyTecanEx.py).
 2. Accept the software license agreement, refusing the agreement will cause the program termination.
 3. Enter the cycle number corresponding to the new Excel file saved in the above section. In this example, the cycle number is 16.
 4. Enter the column number corresponding to the new Excel file saved in the above section. In this example, the cycle number is 12.
 5. Click Upload file and select the new Excel file saved in the above section.
 6. Click Execute to run the program.
 7. Click Save to save the program outcomes.

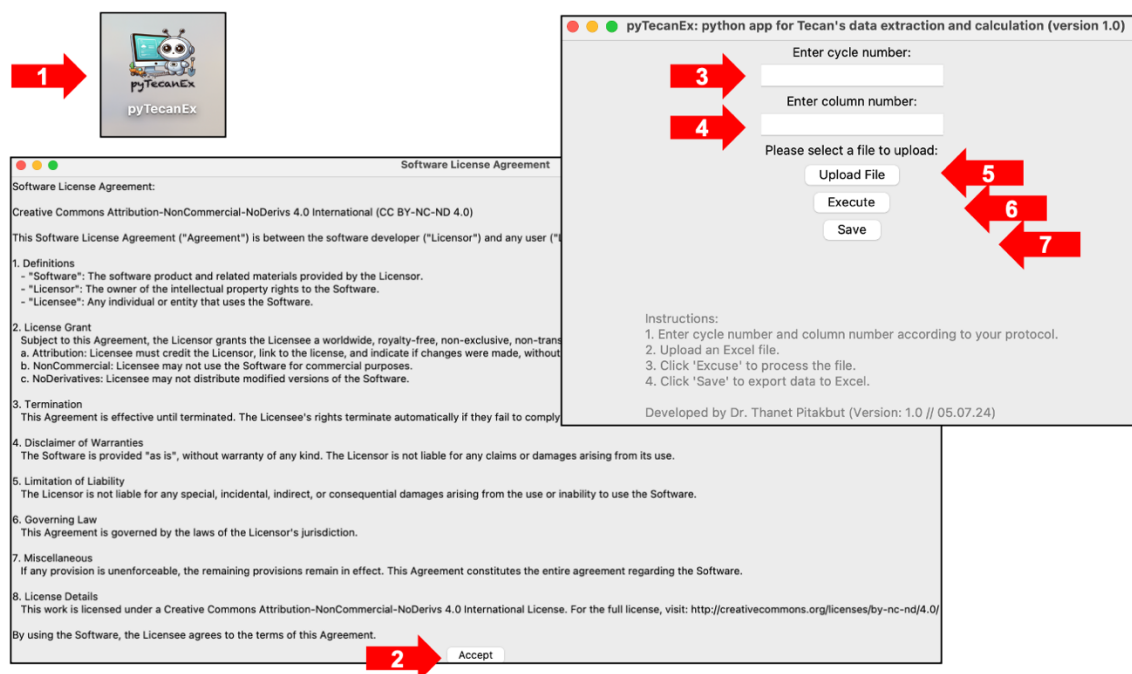


Figure 4. Instructions on how to run the pyTecanEx program, which consists of seven simple steps.