# Growth Curve Analysis Tool

**(Aug. 19 2013)**

1. **Introduction**

GCAT is a web based tool for summarizing microbial growth curves using mathematical modeling. The user interface requires no programming and calls on an R package of the same name which processes input data files, models the curves, calculates important growth parameters from the fits, and returns both graphical and tabular output.

1. **Testing Scope**
   1. **The Entire Work Flow**

* Single plate (Create a single plate assay with default settings)
* Multiple plate (Create a multiple plate assay with default settings)
  1. **Browser and Operating System Compatibility**
* The client side common browsers such as Firefox, Chrome, Safari and IE
* The results can be download and the files can be unzipped on all applicable OS
* The output zip file should contain 3 heat map PDF files for each plate.
* And make sure the heatmap color ranges correspond to the output spreadsheet values for each well.
  1. **Data Validation**
* Any invalid data input should be rejected
* These error messages should look nice, e.g. no rails code error messages.
  1. **The User Interface**
* Layout
* Tooltip Text

1. **Testing Details & Tasks** (Unit tests included where applicable)
   1. Single Plate Work Flow
2. Select Plate Type

* When changing from single-plate to multi-plate, verify that the timestamp automatically change from ‘1/3600’ to <the current time>.

1. Upload Input Data File (CSV format)

* If an Excel file is uploaded, a “nice” error should be displayed to user.
* All valid .csv should be able to be created.

1. Set up analysis parameters
2. Media background

* Test Media background
* Open the input data file in a spreadsheet program.
* Choose the first row entry (blank row) of a non-empty well and note the OD value.
* Select User Input radio button.
* In text box below enter in the chosen OD value.
* Create Assay.
* Verify that the Goodness of fit values for this well are sufficiently close to the default values.

1. OD Transform

* Test log(x+n)
* Using the Single-Plate Example File
* For OD transform set the radio button to log(x+n).
* Enter the number 1 in the text box below.
* Create Assay.
* Diff the output\_gcat.fit output file generated by the test against default output file.
* Should diff clean (if you cannot diff the files just visually inspect outputs)

1. Inoculation time point

* Test inoculation parameter
* Using the Single-Plate Example File
* Enter the number 3 in the inoculation timepoint text box
* Create Assay

1. Growth threshold

* **Bad parameter test**
* Using the Single-Plate Example File
* Set the growth rate to the value of 1.37 (for example)
* Create Assay
* The effect of this should be to exclude all well-fits except well #63 (G8)
* Verify that the desired result occurs, or at least that wells with Max. Values < 1.37 get skipped
  1. Points to ignore
* **Test Points to ignore**
* Using the Single-Plate Example File
* In the Points to ignore text box enter: 70,71,72,73,74,75,76,77,78,79
* Create Assay
* Open YPDAFEXglucoseTests\_2-25-10\_plots\_2013-03-06\_10.54.19 pdf file generated
* Contrast Well 31 (cell G4, page 32) to the same well in the default pdf. Verify that:

The numbered points appear greyed out rather than black for 70-79.

Four red jump diamonds should be gone at these points.

Having removed an area with 4 jumps, the goodness of fit should be greater.

1. Remove jumps

* *This has been removed for now.*
* Verify that no trace of jump removal remains anywhere in GCAT.

1. Timestamp format

* **Timestamp scale and bad input case test**
* Using the Single-Plate Example File
* Change the Timestamp from 1/3600 to 1/84600
* Create Assay
* Verify that all non-empty well fail and that the X-axis on all plots is in the range of 0-1 hours

1. Jumps are detected

* Examine the default output and select a well plot with a goodness of fit in ‘green’ (it would be better to test a good sigmoid than a poor one).
* Open the Single-Plate Example File in a spreadsheet program
* At any data point past two, add .1 to the raw data value of the column for the well you have selected to analyze.
* (You can add .1 to more than one point if you’d like).
* Save the spreadsheet as a different name
* Create Assay
* Examine the output pdf and verify that the altered values were detected as jumps
  1. Multiple Plate Work Flow

Repeat steps a to k above with multiple plate analysis parameters

* 1. Browser and Operating System Compatibility
* Firefox 23.0 on Windows 7
* Google Chrome 28.0.1500.95 on Windows 7
* IE 9.0 on Windows 7
* Firefox 23.0 on OS X 10.8.2
* Google Chrome 28.0.1500.95 on OS X 10.8.2
* Safari 6.0.2 on OS X 10.8.2
* Download the results from a to f
* Unzip the files from steps a to f
  1. Data Validation
     1. Single plate
* Create bad-data set to verify that obvious issues are caught.
  + - Verify that no rails error messages are presented to user when creating assays with bad-data sets.
* Test settling issue with wide variety of files containing this issue.
  + - Use files from: 6.4.1 Bukhman\private\GCAT test files YB 2013-01-07/Trey\ tester.csv to test this issue on production server and testing server to see the difference. The testing sever fixes this issue.
* Set up different analysis parameters
* Validate the results
  + 1. Multiple plate
* Repeated a to d steps above with multiple plate parameters
  + - *For step i, verify that only the correct timestamps will process*
  1. User Interface
* Check layout
* Check Tooltip Text
* Check Mouse Click
* Check Email sending
* Send an email to the link provide at the bottom of the main page.
* Ask Nate (or current GCAT project member) if he/she received the email
* Check Links(user manual etc)
* Download all example files and the instruction guide. Verify that they can be accessed.

1. **Testing Schedule**

Time period: 3-4 days

|  |  |  |
| --- | --- | --- |
| **Starting Date** | **Complete Date** | **Objectives** |
| 08/19/2013 | 08/22/2013 | * Retest and close any open tickets that are fixed or no longer applicable. * An overall test of the workflow needs to be performed. * Excel file functionality has been removed * **Settling issue check** |

# Deliverables

|  |  |  |
| --- | --- | --- |
| **Deliverable** | **Responsibility** | **Completion Date** |
| Test Plan | QA Tester (Enhai Xie) | 08/19/2013 |
| Single Plate Work Flow | QA Tester (Enhai Xie) | 08/20/2013 |
| Multiple Plate Work Flow | QA Tester (Enhai Xie) | 08/22/2013 |

## Notice:

## The remaining issues/tickets are moved to Trac system under Milestone GCAT TBD

## and Milestone GCAT 3 for either fixing or the next release.