

Using the 'chisquare' fitting template

This excel spreadsheet has been developed to enable you to perform a χ^2 fit to your data taking into account your y error bars. In general the y (dependent variable) error bars should be larger than your x (independent variable) error bars and hence dominant. If this is not the case rearrange your data appropriately. If your data are not expected to be represented by a straight line (e.g. by an exponential function of x) then try to transform your y values (e.g. using $\ln(y)$) appropriately. Then follow these instructions.

1. Copy and paste your x , y and $\sigma(y)$ values into Columns C, D and E respectively, starting at Row 17. Remember to use 'Paste Special → Values' if your values are derived from formulae.
2. Enter the number '1' in Column B for every Row in which you have data.
3. Read off the values for the gradient (and uncertainty) and intercept (and uncertainty) from cells B5, C5, B6 and C6.
4. The 'goodness of fit' (how accurately your straight line model actually represents the data) can be estimated from the χ^2 value (Cell B8) divided by the 'number of degrees of freedom' (in this case number of data points – number of parameters) given in Cell B9. For a 'good' fit the $\chi^2/ndof$ value should be approximately 1.0. A value significantly less than this shows you have fiddled your data, or over-estimated the uncertainties on your points! A value significantly greater than 1.0 shows that the data are not well-represented by the model (think about why this might be!). Note that this assumes that all the data-points represent independent measurements. For more details see the hand-out on data analysis in your folder.
5. Don't forget to plot the 'fitted' line (using $y=mx+c$) in your graph as a line alongside your data-points (with error bars). Do not use 'Add Trendline' anymore! If everything has worked correctly, $\chi^2/ndof \sim 1.0$ and errors are Gaussian, then approximately 68% of the points should lie on the 'fitted' line within their error bars.