Chemical Engineering 118
Technical Communications Seminar S22

HW #1: Due Wed 4/20/22 by 6:00 pm

Please UPLOAD your answers in ONE pdf file to GauchoSpace

(1) Making and describing an effective figure

A pressure transducer calibration was carried out by two different technicians in the plant on different days, and they come to you with their data comingled, expressed as voltage output from the sensor at specific pressures in the form of (x,y) data with errors ±(xerror,yerror) as shown below:

x Pressure [bar]	y Signal [V]	xerror Pressure [bar]	yerror Signal [V]
1	9.29	0.32	2.79
2	10.38	0.10	2.18
3	16.91	0.25	2.30
4	27.42	0.29	4.42
5	30.86	0.68	1.50
6	24.12	0.30	1.60
7	40.00	1.49	3.15
8	32.00	0.25	0.32
9	53.10	1.66	3.30
9.5	40.00	0.55	3.80
10	48.09	1.23	4.00

The technicians need you to figure out the best fit calibration line for the data to modify the process control code so it uses the correct pressure. You also have to present these data to your boss and the company that sells the transducer, as well as make a logical argument if the transducer should be implemented in the plant given the data above.

Consider the following for your assessment and "report" to the boss:

(1) Determine the best fit line through the data via two methods:

(a) Using standard regression, where you must also report errors/confidence intervals on the estimated parameters (i.e., slope and intercept).

(b) Using χ^2 minimization, also reporting the slope and intercept.

(2) After finding these calibration parameters, make a single **professional quality figure** showing your results, i.e., with data, error bars, best fit lines, legend, axes labels, caption, etc. as we discussed in class. You can use any software you like.

(3) Are the two calibrations different? If so, explain why, identify which set of calibration parameters you would use, and state why. For instance, what might be going on with the transducer and/or the technicians? Express your findings in one short and descriptive paragraph that references your figure from (2). Make sure to format everything as outlined in class.