

## Tutorial 4

### Non-Parametric Tests

A group of researchers in the field of biomaterials and tissue engineering is investigating the potential of a bioactive hydrogel for promoting bone tissue regeneration. They want to evaluate if their bioactive hydrogel promotes faster bone healing compared to a commonly used synthetic scaffold material. To assess this, they conducted a study using 21 bone defect models in animal subjects, measuring the time taken in days for initial bone regeneration as the primary outcome. Eight of the bone defect models were treated with the bioactive hydrogel (Group 1), while the remaining 14 models were treated with the synthetic scaffold material (Group 2).

#### **Bone regeneration time (healing time) by biomaterial group [days].**

Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bioactive hydrogel	10.7	19.1	10.2	10.9	15.8	12.3	10.2	17.1						
Synthetic scaffold material	16.4	17.2	16.8	17.1	16.9	17.0	16.2	15.0	17.9	20.2	17.2	17.3	16.0	19.1

Use this study and associated data to answer the following questions:

- 1) What type of statistical test should we do here and why? Utilize Q-Q Plots and the Shapiro-wilk test to evaluate this.
- 2) Perform an appropriate test of location to test if the healing time was significantly different for models with the bioactive hydrogel. Specify the steps of the hypothesis test and show the work for the test (by hand or annotated code).
- 3) Run the appropriate test in Python. What do you conclude?