Last updated on October 10, 2025

# BM5033 Statistical Inference Methods in Bioengineering

## Team Projects: Stage 2

1. **What is expected of you in stage 2:** Analyze the experimental data for your scenario and
   (a) compare the experimental design from the data with the one you came up with in Stage 1.
   (b) Compare the sample size you had estimated with that provided in the data
   (c) graphically represent the data in a concise manner. It should highlight the question you are trying to answer.
   (d) analyze the data with the help of statistical procedures/tests etc., and justify the choice of statistical tests if you are deviating from the ones you proposed in stage 1.
   (e) summarize your findings and conclusions
2. **What is not expected from this activity:** The project focuses on the techniques learned in the BM5033 course for scenarios assigned to each group. You are supposed to use the tools covered in the course. It is highly likely that this constraint (using only the techniques covered in the course) will render the design and analysis sub-optimal. That is okay. The objective is to use BM5033 course techniques in the best possible way. It is not to come up with the best design and analysis by using anything and everything under the sun.
3. **Format of the report to be submitted:** The stage-2 report must not be more than 5 pages long with font size 12, single line spacing, and 0.5-inch margins on four sides. It will be better if it is typeset in LaTeX. Do not miss citing all the resources you have used in this stage.
4. **Few cautions:**
   - It is very likely that the data you had in mind while working on stage 1 of the project is completely different from the one you are seeing in this stage. That's fine. No need to panic. If you face this scenario, mention this fact in your report and analyze the data nonetheless.
   - It is also possible that the dataset given for your scenario contains measurements that do not have anything to do with the problem you are working on. In this case, only focus on the relevant data. **Performing statistical tests blindly on all the data provided will attract negative marks.**
   - For each scenario, each team is expected to present statistical evidence from the data to answer the question posed in the problem description. The specific answer to the question is not important as long as it is supported by statistical evidence. Arbitrarily performed tests/procedures/analyses will attract negative marks.
5. **How and when to submit the report:** The deadline for the submission of the report is 17th October 2025 at 17:00 by email.
6. In case of any doubt, please drop me an email and ask for clarity. Verify, do not presume. Beware of convenient assumptions.

## Scenarios

S1 Type-2 diabetes is known to affect the permeability of the blood-brain barrier. You want to test if type-2 diabetes has an effect on microcirculation in the brain. You have access to resources for measurements of cerebral blood flow using transcranial Doppler and MRI.

**Link to dataset:** Cerebromicrovascular Disease in Elderly with Diabetes

S2 Parkinson's disease is a chronic, progressive neurodegenerative disorder involving gait impairment. You want to assess if the age of the patient affects the forces exerted by the left and right legs of the patient.

**Link to dataset:** Gait in Parkinson's Disease

S3 During the COVID-19 pandemic and its aftermath, infrared thermographs became widely used in public places to measure body temperature by scanning facial thermal patterns. In a more traditional setting, the temperature is measured orally using a thermometer. We want to check if both of these measurements give same results.

**Link to dataset:** Facial and oral temperature data from a large set of human subject volunteers

S4 Gestational diabetes mellitus, a glucose intolerance during pregnancy, increases risks for both maternal and fetal complications. You want to check if maternal visceral adipose tissue, that can be measured during routine obstetric ultrasound, during early pregnancy can predict the later development of gestational diabetes mellitus?

**Link to dataset:** Visceral adipose tissue measurements during pregnancy