Practical Assignment Bayesian Optimization Course 2025

You will work in groups of four students (using the groups that have already been formed on Brightspace) on a project related to constrained Bayesian optimization (BO).

Your goal is to either:

1. **Design your own, novel constrained BO algorithm**, or
2. **Modify or extend** one of the algorithms presented in class to improve its performance.

Project Requirements:

1. **Implementation & Reproducibility:**
   - Your code must be fully reproducible:
     - Use fixed random seeds.
     - Include a clear README.md (GitHub-style) explaining how to install dependencies (requirements.txt) and run the experiments.

   - Your implementation must be properly benchmarked:
     - Against at least one baseline from the state of the art. Mandatory baseline: BoTorch constrained BO with qLogEI (batch size q=1), which you can extract from this tutorial:
       https://botorch.org/docs/tutorials/closed_loop_botorch_only/
     - If you extend one of the methods presented in class (by yours or other groups), also compare to its original (unmodified) version.

2. **Benchmarking Setup:**

   Use the constrained BBOB functions from the COCO environment (Link: https://numbbo.github.io/coco-doc/bbob-constrained/functions.pdf)

   - Functions: F2, F4, F6, F50, F52, and F54
   - Instances 0, 1, and 2
   - Repetitions: 5 per instance
   - Dimensions: 2, 10, 40
   - Minimum total evaluation budget: 10*D (where D = dimensionality)

   Example of benchmarked method on constrained BO: https://arxiv.org/pdf/2506.14619. This can be used to structure well your experimental study.

3. **Poster and Presentation:**

   Prepare a digital A0 poster (landscape) summarizing your work. It must contain motivation and novelty, method overview, experimental setup, results (**must include convergence plots**; other types of analysis are welcome)

You will present the poster in person during the last sessions of the BO course, but the digital version must be delivered by the practical assignment deadline.

Evaluation & Weighting

- Implementation and Reproducibility: 20% of final grade
- Poster and Presentation: 10% of final grade
- Total = 30% of final grade

Grading Rubric

Criterion	Excellent (9–10)	Good (8)	Satisfactory (6–7)	Insufficient (≤5)
Concept & Originality (25%)	Clear, innovative idea; well-justified design choices; strong link to constrained BO theory.	Idea shows creativity and sound reasoning, but limited novelty.	Basic adaptation of known methods with minimal innovation.	Unclear, unoriginal, or unjustified concept.
Method Implementation (25%)	Code is clean, modular, reproducible (seeded, documented, easily runnable). Includes README and config files.	Mostly reproducible and organized; minor documentation issues.	Code runs but lacks clarity or reproducibility; minimal documentation.	Code incomplete, non-functional, or irreproducible.
Benchmarking & Experimental Design (25%)	Comprehensive evaluation on all required functions/dimensions; well-structured experiments; meaningful baselines.	Solid evaluation but missing one dimension/function.	Minimal benchmarking; unclear parameter settings or missing comparisons.	Poor or no benchmarking; results unreliable.
Analysis & Results (25%)	Convergence plots clear and correctly interpreted; insightful discussion of findings.	Clear plots and reasonable discussion, but lacks depth.	Results included but weakly analyzed or inconsistent.	Missing or uninterpretable results.
Poster & Presentation	Visually appealing, well-structured poster; confident, clear oral explanation; demonstrates understanding.	Poster clear and mostly complete; presentation solid but not polished.	Poster readable but lacks focus; presentation unclear or brief.	Poster missing or unreadable and/or very poor presentation.