

Exam 2 Topics

BIOE 498/598 PJ

Spring 2022

Surrogate Optimization

- Initial designs
- Surrogate models
- Model-guided search

Steepest Ascent

- Purpose
- Vocab: design space, center point, design radius
- Ascent direction for FO models
- Standard step sizes
- Confirmation runs and model breakdown
- Ascent directions for FO + TWI models
- Testing for lack of fit due to curvature

Response Surface Methodology

- Quadratic approximations to nonlinear response surfaces
- Central Composite Designs (CCDs)
 - Parts and their role in estimating parts of the SO model
 - Uniform precision
 - Rotatable designs
 - Calculating factor levels
- Optimization
 - Stationary points
 - Eigen-analysis of stationary points
- Alternative designs (pros and cons of each)
 - Box-Behnken
 - Hoke
 - Koshal
 - Roquemore Hybrid
 - Small Composite Designs (and Resolution III*)
 - Definitive Screening Designs

Global Optimization

- Space-filling designs
 - Latin Hypercubes
 - Maximin
- Gaussian Process Regression
 - Interpolation with kernels
 - Hyperparameter optimization

- Uncertainty
- Model-guided search
 - Exploitation vs. exploration
 - Expected Improvement
 - Limitation of greedy optimization