STA 215: STATISTICAL INFERENCE LECTURES: WF 1:15-2:30 PM LANG 211, OFFICE HOURS: WTH 2:45-3:45 PM OLD CHEM 219A. SURYA TOKDAR (Instructor), Old Chem 219A, 684-2152, tokdar@stat.duke.edu DAVID MCCLURE (TA), Old Chem 211A

Course Description

This is a course on statistical inference i.e., the method of drawing conclusions from noisy data. Conceptual and mathematical aspects behind the two dominating paradigms of statistical inference, namely, classical and Bayesian will be covered, with likelihood function serving as a common thread. Prerequisite: STA 213 level background in probability.

Topics

- 1. Statistical models, parametrization, exponential families, goals of inference.
- 2. Calibrating evidence from data, the likelihood function.
- 3. Maximum likelihood methods, Bayesian methods.
- 4. Classical statistics, frequentist guarantees.
- 5. Bayesian statistics, posterior summary, choice of priors.
- 6. Classical theory of optimality, sufficiency, information bound, optimality of MLE.
- 7. Elements of decision theory, admissibility, optimality of Bayes procedures.
- 8. The likelihood principle.

Texts

| Recommended | Bickel & Doksum. Mathematical Statistics: Basic Ideas & Selected Topics (2/e) | | |
|-------------|---|--|--|
| Others | Ghosh, Delampady & Samanta. An introduction to Bayesian analysis: theory | | |
| | ${\mathfrak E}$ methods. | | |
| | Casella & Berger. Statistical Inference. | | |
| | Berger & Wolpert. The Likelihood Principle. | | |
| | Kadane. Principles of Uncertainty. | | |

Assessments

| Homework | Midterm | Final |
|----------|---------------------|-------------------|
| 25% | 30% | 45% |
| Biweekly | Feb 29 (W in-class) | Apr 30 (M 9-Noon) |

HW submission is must, delays in submission must be pre-approved. No make-up for midterm. Excused mid-term (due to illness, death in family, etc.) will be subsumed into the final.