Course Outline STA453H1

from the private notebook
of
David Brenner
Jan. 10, 2023

contact info: lectures:

Prof. David Brenner Tues. 12-1, Thurs. 12-2
brenner@utstat.toronto.edu (both in MS 2172)
office: Tues. 1-2

ref./text:

Brenner, D.:
FROM THE PRIVATE NOTE BOOK OF:
Illustrated adventures in very (very) mathematical
probability & statistics, 2004-23

Fraser, D.A.S.:

Knight, K.:
MATH STATS (2000)

Lehmann, E.L.:
TESTING STAT HYPs (1957/86) & THRY of PT EST (1986)

Silvey, D.F.:
STAT INF (1976)
\begin{itemize}
\item caution: all contents subject to shuffling, merging, expansion & (really serious) modification

\item the general statistical model & the structure of inference
  frequentist & bayesian
  confidence & testing

\item confidence/credibility, optimality & likelihood
  both small sample & asymptotic

\item sufficiency & the likelihood statistic
  - the rao-blackwell & lehman-scheffe theorems
  - the neyman factorization criterion (halmos & savage)
  - estimation theory: consistency, unbiasedness, minimum variance & relative efficiency

\item exponential models & sufficiency in the finite dimensional case
  - cramer-rao theorem & cauchy-schwartz
  - the mathematics of moment generating functions

\item the general linear model & orthogonal projection
  - correlation, regression & conditional expectation

\item $G$-models, fiducial structure & invariance/symmetry
  - location-scale models

\item hypothesis testing
  - testing means, variances: differences & ratios
  - neymann-pearson theory & the likelihood ratio test

\item bayesian theory - frequentist theory
  a tale of two magisteria; uneasy alliance
\end{itemize}

grading ($G$):

assessment one ($A_1$) = 40 \quad Thurs. Feb.16 \quad (due in person)
assessment two ($A_2$) = 60 \quad Thurs. Apr.6 \quad (due in person)
final grade $G = A_1 + A_2$