STA7347 **Advanced Inference** **Fall, 2022**

Instructor: Malay Ghosh

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Course Outline: The objective of STA 7347 is to introduce students to some special topics in statistical inference, primarily frequentist. We will begin with concentration inequalities followed by some detailed disscussion of the Wishart distribution. I will also cover asymptotics of Jackknife and Bootstrap. Next comes multiple testing culminating in the Benjamini-Hochberg FDR. This will be followed by Edgeworth expansion and the saddlepoint approximation. I will also discuss some classical topics such as ancillary statistics and some new likelihoods, such as the profile likelihood, modified profile likelihood and adjusted profile likelihood.

Course Policy: A student's grade will be determined from homeworks and a presentation.

Course Outline:

1. Concentration Inequalities.
2. Wishart Distribution.
3. Jackknife and Bootstrap
4. Multiple Testing.
5. Edgeworth Expansion.
6. Saddlepoint Approximation.
7. Ancillary Statistics
8. New Likelihoods.

Course Material: Lecture Notes of the Instructor

References

1. Barndorff-Nielsen, O.E. and Cox, D.R. : Inference and Asymptotics. Chapman and Hall, London.
2. S. Boucheron, G. Lugosi and P. Massart: Concentration Inequalities: A Nonasymptotic Theory of Independence.
3. D.R. Cox and D.V. Hinkley: Theoretical Statistics. Chapman and Hall, London.
4. B. Efron: The Jackknife, the Bootstrap and other Resampling Schemes. SIAM, 1982.
5. B. Efron: Large Scale Inference. Cambridge University Press.
6. J.K. Ghosh: Statistical Information and Likelihood: a Collection of Critical Essays by Dr. D. Basu.
7. J.K. Ghosh: Higher Order Asymptotics. NSF-CBMS Conference Series, Volume 4.
8. R. Vershynin: High-Dimensional Probability: An Introduction with Application in Data Science.
9. M. Wainwright: High-Dimensional Statistics: A Non-Asymptotic Viewpoint. Cambridge University Press.