STA7347   **Advanced Inference**   **Spring, 2020**

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. Next comes multiple testing culminating in the Benjamini-Hochberg FDR. We will also discuss come classical topics such as ancillary statistics and the celebrated likelihood principle. We will also cover Edgeworth expansion and the saddlepoint approximation. If time permits, we will discuss 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 five homeworks.

Course Outline:

1. Concentration Inequalities.

2. Wishart Distribution.

3. Multiple Testing.

4. Likelihood Principle and Ancillarity.

5. Edgeworth Expansion.

6. Saddlepoint Approximation.

7. 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. J.O. Berger and R. Wolpert: The Likelihood Principle. IMS Lecture Notes Monograph Series.a

3. S. Boucheron, G. Lugosi and P. Massart: Concentration Inequalities: A Nonasymptotic Theory of Independence.

4. D.R. Cox and D.V. Hinkley: Theoretical Statistics. Chapman and Hall, London.

5. B. Efron: The Jackknife, the Bootstrap and other Resampling Schemes. SIAM, 1982.

6. B. Efron: Large Scale Inference. Cambridge University Press.

7. J.K. Ghosh: Statistical Information and Likelihood: a Collection of Critical Essays by Dr. D. Basu.

8. J.K. Ghosh: Higher Order Asymptotics. NSF-CBMS Conference Series, Volume 4.

9. T. Severini: Likelihood methods in Statistics. Oxford University Press, Oxford, England.

10. R. Vershynin: High-Dimensional Probability: An Introduction with Application in Data Science.

11. M. Wainwright: High-Dimensional Statistics: A Non-Asymptotic Viewpoint. Cambridge University Press.