

## SYLLABUS FOR MATH 6263: Testing Statistical Hypotheses.

- TEACHER: Heinrich Matzinger. E-mail: [matzi@math.gatech.edu](mailto:matzi@math.gatech.edu)
- WHERE and WHEN: 15:05 - 16:25 pm, MW, Skiles 169
- OFFICE HOURS: Monday 13:30-14:55 or by appointment, OFFICE Skiles 264.
- TEXT BOOK: Testomg Statistical Hypotheses, by E.L Lehmen and Romano, Springer texts in Statistics and LECTURE NOTES of H. Matzinger, which will be sent out over E-mail.
- FINAL GRADE: consists of 60% of the work during semester and 40% final. Every homework which gets graded and every midterm count the same.
- MIDTERMS: There will be at least four mid-terms. The midterms contain problems like in the homeworks and preparation tests and you need to learn some proofs as indicated by Matzinger. The temptative dates for the tests are: September 2, September 23, October 14, November 11.
- HOMEWORKS: For some homeworks, solution sets will be send over the internet.
- FINAL EXAM: consists mainly of problems like in the midterms, homeworks and proofs which Matzinger will indicate.
- Matzinger will communicate with you by E-mail and send you all the information through E-mail.
- We work according to the Georgia Tech Honor code: <http://www.honor.gatech.edu>

### COURSE DESCRIPTION:

- Decision Theoretic Context, Geometry of the Risk Set, and Relationship to Classical Testing Criteria
- Univariate Testing:
  1. Neyman-Pearson lemma for simple versus simple hypotheses
  2. application to UMP tests for monotone likelihood ratio families
  3. exponential families of distributions

4. generalized Neyman-Pearson lemma and application to UMPU single parameter tests
  5. locally best tests with applications to rank tests
- Testing in Multivariate Koopman Darms Families
    1. similarity and completeness
    2. application to UMPU tests, including the one and two sample t-tests
    3. group invariance of statistical decision problems and its use in testing hypotheses
    4. UMPI tests including the general linear model
  - Large Sample Properties: Pitman Efficiency, Applications to Distribution-Free Tests
  - Sequential Testing: Optimality of the SPRT