Syllabus
Undergraduate version

Course Number: STA 562

Course Title: Statistical Computing

Credits: 3:0:3

Prerequisites: STA 371 or 580 and working knowledge of a scientific programming language or permission of instructor.

For Whom Planned: This course is planned for advanced undergraduate and graduate students who wish to gain an understanding of computer-intensive statistical methods. It will be an approved elective for the Statistics concentration in the B. S. in Mathematics. Thus, we expect most students will be Mathematics, Computer Science and Statistics majors.

Instructor Information: Dr. Scott Richter, 389 Bryan, 256-1123, sjricht2@uncg.edu.

Catalog Description: Statistical methods requiring significant computing or specialized software. Simulation, randomization, bootstrap, Monte Carlo techniques, numerical optimization. Extensive computer programming involved. NOT a course in the use of statistical software packages.

Student Learning Outcomes:

Upon completion of the course, students should be able to:

- Implement algorithms for numerical optimization and estimation.
- Simulate random processes.
- Perform statistical inference using computer-intensive methods.

Teaching Strategies: This will be a lecture course supplemented with hands-on classroom activities and computer demonstrations. Students will practice course concepts with homework assignments

Evaluation Methods and Guidelines for Assignments: Students will be evaluated using two in-class tests and a final exam as well as graded homework assignments. Students are expected to do their own work and sign the Honor Code on all submitted work. The overall course average will be calculated as follows:

Test 1	20%
Test 2	20%
Final Exam	20%
Homework	35%
Class participation	5%

The course grade will be determined by the following scale:

90-100	A
80-89	B
70-79	C
60-69	D
50-59	F

Required Texts/Readings/References:

Gentle, J. E. *Elements of Computational Statistics*, Springer-Verlag, New York, 2002.

Topical Outline:

Week 1	Numerical Computations and Algorithms
Week 2	Random Number Generation and Monte Carlo Methods
Week 3	Simulation
Week 4	The Bootstrap

Week 5	Test 1; Permutation Tests
Week 6	Nonlinear Systems
Week 7	Approximating Functions and Smoothing Data
Week 8	Generalized Linear Models
Week 9	
Week 10	Test 2; Univariate optimization
Week 11	Multivariate optimization
Week 12	Graphical methods
Week 13	
Week 14	EM algorithm
Week 15	Gibbs sampling and ensemble learning

Academic Honor Code: All students are expected to abide by the UNCG Honor Code at all times. Each student will be required to sign the Honor Statement on all major work submitted for the course.

Attendance Policy: Students are expected to attend all classes. Students who miss more than three classes may be dropped from the course.