HMI504. Experimental Design and Statistical Methods, 5p.

Instructor	Kip Smith, IAV/IKP/LiU, kipsm@ikp.liu.se
Semester	Spring 2004
Prerequisites	Graduate status or qualified undergraduate. All prospective students, graduates and undergraduates alike, must hand in the qualifying exam at the beginning of the first class session. Part of the qualifying exam involves demonstrating fluency with writing equations in Microsoft Excel. If you have excessive trouble with the exam, you are ill-prepared for this course.
Goals	This is a graduate-level introduction to empiricism and associated statistical techniques. For a more thorough review of statistical analyses, consult the department of statistics. The purpose of the course is to coax you to think empirically. Thinking empirically involves (a) making observations of behavior, (b) asking questions about the observations, (c) formulating alternative testable hypotheses that might answer the questions, (d) designing tests of the hypotheses, (e) conducting the tests (running an experiment) and making observations (collecting data), (f) analyzing the data, (g) asking questions about the analyses, (g) reformulating the hypotheses, (h) designing new tests, … and (n) understanding why this cycle of inquiry never stops. The sessions are designed to give you opportunities to learn by practice (1) how to apply the scientific method in rigorous experimental investigations of the behavior of humans and of the utility of engineered systems, and (2) how to think critically about the research of others.

Topics	The QuALMRI rubric for the conduct, presentation (in APA format), and analysis of empirical research. Descriptive and parametric inferential statistics including, but not limited to: Between and within-subjects t tests Chi-square test Regression Linear, multiple, and time series analysis Analysis of Variance (ANOVA) Single factor, two-factor, unequal sample sizes, random and mixed effects Power Quasi-experiments
Materials	A Book to be determined. Course packet (to be available on course website)
Demonstrations of student proficiency	Grades will be determined by the total points earned. There are a maximum of 100 pts. Homework. Weekly, to be handed in. 30 pts Class participation. In every class session, students will be expected to volunteer to 'go to the board' where you will present your solutions to homework problems. 10 pts Class project. Every student will independently design, conduct, and analyze the data from an experiment with human subjects. Presentation. The final two sessions will be devoted to 20- to 30-minute student presentations of the class project. 30 pts Final paper. Every student will independently write a paper in standard APA format about the class project 30 pts
Note	This class will be taught in American English.