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STATISTICS FOR ENGINEERS AND SCIENTISTS  
STAT 4073: FALL 2010

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**Ole J. Forsberg, Ph.D**

**Class**  
AGH 320  
MWF 10:30 - 11:20

**Office**  
MSCS 309  
MWF 9:30 - 10:15

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<http://oforsber.kvasaheim.com/courses/stat4073/>

### **Purpose and Content of the Course**

The purpose of this course is to prepare students for further study and job preparation in the fields of Engineering and Sciences by teaching statistics and probability skills. The course content includes (but is not limited to) descriptive statistics, probability distributions, confidence intervals, hypothesis testing, regression, factorial experiments, and statistical quality control

### **Prerequisite**

Calculus

### **Required Materials**

Textbook: *Statistics for Engineers and Scientists* (2nd edn.) W. Navidi. McGraw-Hill.

Calculator: The examinations allow (expect) the use of a scientific calculator. Make sure your calculator has the following keys: +, -, \*, /, ^, nCr, nPr, (, and ). Acceptable calculators will also have *neither* a QWERTY keyboard nor a phone.

### **Examinations**

I will give three 50-minute examinations during the semester, as well as a 1:50 comprehensive final examination. A calculator is permitted for each examination.

Should your final examination score be greater than your worse examination score, the final examination score will also replace that lowest score.

No makeup examinations are given.

## Homework

Each weekly homework assignment has approximately 10 problems. The assignment is posted every Friday on the website. The homework is due at the beginning of class on the following Friday. Should class not be held on that Friday, the homework will be due the next class period.

Each homework assignment is worth 10 points.

You *should* type your homework; this shows professionalism. It also offers you practice for the future, when you are paid to type your job assignments. You may use any word processor or typesetting program. I recommend LaTeX (and the MiKTeX distribution). Should you decide to type a homework assignment, you will receive an additional 10%.

There will be assignment parts where you will be required to type your answer. These can be typed separately and attached to the back of your homework if you do not type the remainder of your assignment.

## Overall Course Grade

I will calculate your percent in the course by adding all of the points you earned during the semester and dividing by the total number of points possible. This percentage is then used to determine your final letter grade for the course: 90% and above = A; 80 – 90% = B; 70 – 80% = C; 60 – 70% = D; below 60% = F.

## Course Schedule

Of course, this schedule is subject to change as necessary. The current schedule is posted to the website.

Date	Text sections	Topics
August	23 §1.1	Sampling
	25 §1.2 – 1.3	Summary statistics and graphing
	27 §2.1 – 2.2	Probability and counting
	30 §2.3	Conditional probability and independence
September	1 §2.4 – 2.5	Random variables and linear functions
	3 §3.1 – 3.2	Measurement errors
	6 Labor Day	No classes
	8 §3.3 – 3.4	Uncertainty
	10 §4.1 – 4.3	Bernoulli, Binomial, and Poisson distributions

Date	Text sections	Topics
	13 §4.5 – 4.7	Normal, Lognormal, and Exponential distributions
	15 §4.4; §4.8	Other distributions
	17 §4.10 – 4.11	The Central Limit Theorem
	20 §4.12	Simulation
	22 Review	
	<b>24 Examination I</b>	
	27 §5.1	Large-sample confidence intervals (means)
	29 §5.3 – 5.4	Small-sample confidence intervals (means)
October	1 §5.2; §5.5	Confidence intervals (proportions)
	4 §5.6 – 5.7	Paired data
	6 §5.8	Simulation
	8 §6.2	Hypothesis testing
	11 §6.1; §6.4	Hypothesis tests (population mean)
	13 §6.3; §6.6	Hypothesis tests (proportions)
	15 <b>Fall Break</b>	<b>No classes</b>
	18 §6.5; §6.7	Hypothesis tests (difference between two means)
	20 §6.8	Hypothesis tests (paired data)
	22 §6.10	The Chi-squared test
	25 §6.11	The F-test
	27 Review	
	<b>29 Examination II</b>	
November	1 §6.12 – 6.13	The power of a test
	3 §6.14	Multiple tests
	5 §6.9	Distribution-free tests
	8 §6.15	Simulation
	10 §7.1	Correlation
	12 §7.2; 7.3	Linear Regression
	15 §8.1 – 8.2	Multiple regression
	17 §8.3; §7.4	Model selection and assumptions
	19 §9.1 – 9.2	One-factor experiments
	22 §9.3 – 9.4	Two-factor experiments

Date	Text sections	Topics
	24 Thanksgiving	No classes
	26 Thanksgiving	No classes
	29 §9.5	2 <sup>p</sup> -factor experiments
December	1 Review	
	<b>3 Examination III</b>	
	6 §10.1	Statistical quality control
	8 §10.2 – 10.3	Control charts
	10 §10.4 – 10.5	Process capability
	<b>13 Final Examination</b>	<b>10:00 – 11:50</b>

## Ethics

Feel free to discuss the assignments and other aspects of the course with your peers. However, when you actually do the homework, you need to do it on your own. This includes the time you spend working through the problems as well as the time you spend writing up your homework assignment.

## Final Thoughts

The purpose of statistics is to gain information about the underlying real-world process. As we explore the topics in this course, you will begin to ask which technique is the best technique. The short answer is that (in general) there is no "best" technique, only a series of techniques with different assumptions that get a person closer to understanding that real-world process.

The key to succeeding in statistics is to know the answers to three questions:

1. What is the real-world process I am interested in?
2. How are the data collected?
3. What do I want to know about the real-world process?

Once you have answered these three questions, and only then, you can select several statistical techniques (based on your answers to Questions 2 and 3) to connect Question 3 with Question 1. Remember, statistics concerns itself with helping one learn about a real-world process; it means nothing without reality.