Course Description for Experimental Design, AN, 7.5 hp

Department of Statistics

November 5, 2012

1. Course content

The course provides knowledge about experimental designs and analysis of data from experiments. Analysis of variance, randomized block designs, Latin-square designs, linear mixed models, split-plot designs, response surface methodology, mixture models and fractional 2k experiments are studied. Applications of experimental planning and analysis of variance play a prominent part. The course content is valuable when planning and carrying through experiments.

2. Intended learning outcomes

After the course, the students should be able to

- Give an account for the basic methods for statistical planning of experiments.
- Analyze data from a planned experiment, using analysis of variance.

3. Literature and plan for the lectures

- **Text book**: Montgomery, D. C. (2013). Design and Analysis of Experiments, eighth edition.

The course covers the text book sections that are listed in Table 1. The course comprises 14 lectures (F1- F14) and two computer sessions (C1 & C2).

Table 1: Preliminary plan for teaching

Lecture	Date	Content	Section in textbook
F1	5/11	Introduction for the course, ANOVA	1, 2, 3
F2	12/11	Linear Model (LM)	3, 10
F3	14/11	LM and Blocking Factors	4, 10
F4	19/11	Blocking Factors	4
F5	20/11	Factorial Experiment	5
F6	27/11	Random Effects Models	13
C1	20/11	Computer Exercise	
F7	3/12	2^k experiment	6
F8	4/12	Blocking in 2^k experiment	7
F9	7/12	Fractions of 2^k experiment	8
F10	10/12	Discussion for Exercises/Assign.	
C2	10/12	Computer Exercise	
F11	13/12	3^k experiment	9
F12	14/12	Response Surfaces	11
F13	17/12	Nested factors, split-plot designs	14
F14	18/12	Other topics and Summary	

4. Examination and criteria for assessment

The following seven criteria-referenced grades are used:

- A: Excellent
- B: Very good
- C: Good
- D :Satisfying
- E: sufficient
- F:Insufficient

A (Excellent): The student can correctly use statistical techniques for planning and analysis of experiments that have been considered in the course. Moreover, the student can apply the statistical techniques correctly on problems that have not been discussed in the course. The student can present problem solutions clearly and use a correct statistical language.

B (Very good): The student can correctly use statistical techniques for planning and analysis of experiments that have been considered in the course. The student can present problem solutions clearly and use a correct statistical language.

C (Good): The student can correctly use statistical techniques for planning and analysis of experiments that have been considered in the course.

D (Satisfying): The student can correctly use statistical techniques for planning and analysis of a majority of experiments that have been considered in the course. The student can present problem solutions clearly and use a correct statistical language.

E (Sufficient): The student can correctly use statistical techniques for planning and analysis of a majority of experiments such that have been considered in the course.

F (Insufficient): The student cannot correctly plan, analyze and report results from experiments that have been considered in the course.

Examination

The student is assessed through assignments and a written examination. The examination and the assignments are individual. The written examination comprises a number of problems that can give a total of at most 80 points, and the assignments comprise at most 20 points that will be added to the result of the written examination. A single final grade for the complete course is given according to Table 3.

Table 3: The sum of the points from the assignments and the written examination, and final grade in the course.

Points	Grade
91-100	A
81-90	B
71-80	C
61-70	D
51-60	E
0-50	F

5 Lecturer and examiner

- Asrat Temesgen
- Phone: 08-161323
- e-mail: asrat.temesgen@stat.su.se

Recommended problems from your textbook:

Chap 2 - 2.18, 2.19, 2.29, 2.27, 2.34.

Chap 3 – 3.15, 3.18, 3.20, 3.21, 3.24, 3.27, 3.31, 3.32, 3.34, 3.39.

Chap 4 – 4.9 a & b, 4.22, 4.36, 4.40.

Chap 5 – 5.6, 5.7 a& b, 5.14.

Chap 6 – 6.1, 6.2, 6.7, 6.12.

Chap 7 – 7.1, 7.2, 7.4, 7.5.

Chap 8 – 8.1, 8.3.

Chap 9 – 9.1, 9.2, 9.7.

Chap 10 – 10.1, 10.6, 10.7, 10.9 a,b, c , 10.12.

Chap 13 – 13.2, 13.20, 13.21.

Chap 14 – 14.1, 14.3.

Further recommended problems might be given during the lecture. Moreover, the solutions to some of the problems should be submitted. You may use R (programming language) whenever it is necessary.

Asrat Temesgen/Ying Li