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STOCKHOLM UNIVERSITY
Department of Statistics
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Course Description for Generalized Linear Models (GLM), 7.5 Higher Education Credits (HEC) at advanced-level, Course Code: ST425A

COURSE CONTENTS

The course deals with statistical models and methods for analyzing data with quantitative and qualitative responses – including Linear Models, Analysis of Variance (ANOVA) and Covariance (ANCOVA). Emphasis will be on the logical and mathematical foundations of the techniques and their applications to real-life data using computer programs. Prior knowledge to probability and inference theory, calculus, matrix algebra, and literacy in computer programs like SAS or R, is assumed. The topics that will be covered in more details include:

- Linear Models for Continuous Responses
- Logit Models for Binary and Ordinal Responses
- Logit Models for Ordinal and Sequential Responses
- Poisson Models for Count Data
- Survival Models for Duration Data
- Multilevel Models for Clustered Data

LEARNING GOALS

After completing the course, the student is expected to:

- describe and explain the models that belong to the class of generalized linear models,
- determine situations in which each model is appropriate for given problem and data set,
- use and apply these models in statistical analysis of data in the social sciences and related areas using relevant statistical software,
- present and discuss, orally and in writing, the results of studies based on generalized linear models (including contents of scientific papers on generalized linear models)

TEACHING FORMAT

Teaching consists of 12 lectures (L1 - L12) and 6 computer-sessions (C1-C6). More detailed instructions on these will be provided during the first lecture (L1) and/or first computer session (C1).

COMPULSORY ATTENDANCE

- Lecture 1 and Computer Session 1 (where general information about the course and instructions on the computer sessions will be provided) are obligatory.

EXAMINATION AND GRADING

Individual examination (max 50 points) which consists of two parts:

Part I: a written examination (max 30 points) that covers the material of the course,

Part II: a written examination (max 20 points) on practical analysis of data using SAS or R.

The minimum points required to pass the course are 20 points for Part I and 10 points for part II.

Requirements for the Part II:

- The student should properly use the theory of Generalized Linear Models when conducting data analysis.
- The student should be able to correctly use statistical terminology and clearly present and interpret obtained results.
- The statistical software used should be R or SAS.
- The results should be reported in the form of a written paper.

The final grade is based on the sum of points for Parts I and II, according to the following criteria:

Grade	Criteria (Requirements)
A	Excellent: The student can correctly describe and use the theory of generalized linear models as it is considered in the course. Moreover, the student can apply this theory to practical problems that have not been discussed in the course. The student can clearly present correct solutions to problems relevant for the course and use a correct statistical language. The grade corresponds to a total of 47.5 -50 points of the examination score.
B	Very Good: The student can correctly describe and use the theory of generalized linear models as it is considered in the course. The student can apply this theory to practical problems of a type that has been discussed in the course. The student can clearly present correct present solutions to problems relevant for the course and use a correct statistical language. The grade corresponds to a total of 45 - 47 points of the total examination score.
C	Good: The student can correctly describe and use the theory of generalized linear models as it is considered in the course. Moreover, the student can apply this theory to practical problems of a type that has been discussed in the course. The student can present correct solutions to problems relevant for the course and use a correct statistical language. The grade corresponds to a total of 40 - 44.5 points of the total examination score.
D	Satisfactory: The student can correctly describe and use the theory of generalized linear models as it is considered in the course. The student can apply this theory to a majority of practical problems that have been discussed in the course. The student can present correct solutions to a majority of problems relevant for the course and use a satisfactory statistical language. The grade corresponds to 35 - 39.5 points of the total examination score.
E	Adequate (Sufficient): The student can correctly describe and use the theory of generalized linear models as it is considered in the course. The student can apply this theory to a majority of practical problems that have been discussed in the course. The student can present satisfactory solutions to problems relevant for the course and use a satisfactory statistical language. The grade corresponds to 30 - 34.5 points of the total examination score.
Fx	Inadequate (Insufficient): The student cannot correctly describe and use the theory of generalized linear models as it is considered in the course. The student cannot present satisfactory solutions to problems relevant for the course or cannot use a satisfactory statistical language. The grade corresponds to 20 - 29.5 points of the total examination score.
F	Totally Inadequate (Totally Insufficient): T The student cannot describe and use the theory of generalized linear models as it is considered in the course. The student cannot present satisfactory solutions to problems relevant for the course or cannot use a statistical language. The grade corresponds to 0 - 19.5 points of the total examination score.

- A grade of E or higher is required in order to pass the course.
- Students who have attained the grade Fx or F on an examination are entitled to at least four additional examinations to achieve at least grade E as long as the course is offered.
- Neither Fx nor F are passing grades and both demand some form of re-examination.
- Students who have received at least grade E on an examination may not retake another examination in an attempt to achieve a higher grade.
- Students who have received the grade Fx or F on an examination on two occasions by the same examiner have the right to request that a different examiner be appointed to set the grade of the examination on the next possible occasion. The request must be in writing and sent to the head of the department. The examination denotes all compulsory elements of the course.

COURSE LITERATURE AND OTHER TEACHING MATERIALS

- Dobson, A.J. and Barnett, A.G. (2018). An Introduction to Generalized Linear Models (Fourth Edition). Boca Raton, FL: Chapman and Hall/CRC.

Software: SAS and/or R

Some additional material may be handed out (or made available in Mondo) during the course.

COURSE INSTRUCTOR AND EXAMINER

- Gebrenegus Ghilagaber (Lectures and Examination): Room B727. Tel. 08-162983, E-mail: Gebre@stat.su.se, Consultation hours: Mondays 13-14 or by appointment.
- Mahmood Ul-Hassan (Computer Sessions): Room B744. Tel. 08-162970, E-mail: Mahmood.Ul-Hassan@stat.su.se, Consultation hours: Mondays 13-14 or by appointment.