Stockholm University

Course Description
Statistical Methods,
ST741A, 7.5 hp

Department of Statistics

(Draft from 14th of April, 2020) Spring, 2020

1. Course content

This course introduces several statistical techniques that might be used as bits of methodological part for writing M.Sc. thesis. Course content and instructors vary from year to year. Reading material is distributed at Athena homepage of the course by instructors before their corresponding part starts. Students are expected to write 1-3 (depending on the number of teachers involved in the course but at least one report per teacher) home assignments 5-15 pages long to demonstrate understanding of methods presented.

2. Intended learning outcomes

After the course, the students should be able to:

- Choose suitable statistical models/methods and to motivate their choices
- Perform analysis using chosen models/methods and evaluate their fit

3. Literature and plan for the lectures

- Research papers and other material provided by instructors;
- Attendance of the introductory lecture is strongly recommended

Selected books and papers to be used during the course:

Christian P. Robert and G.Casella ”Introducing Monte Carlo Methods with R”, 2010, Springer. (AA’s Part)

G.Casella, E.I.George (1992) “Explaining the Gibbs Sampler”, The American Statistician, vol. 46, No. 3, pp. 167-174. (AA’s part)

AA part description:

MCMC-type simulation techniques and Conjugate Families of Distributions (May 4; May 7, 8, 11)

Bayesian computations via Gibbs Sampler and related Markov Chain Monte Carlo methods are in the core of this part of the course. The use of the Gibbs sampler for Bayesian computations is reviewed, explained and illustrated. Some other Markov Chain Monte Carlo simulation methods are also briefly described. Several techniques to check convergence of suggested chains are mentioned.

We will discuss number of examples for conjugate Bayesian analysis. Special attention will be devoted to understanding Gaussian case: majority of material in this section will be left for home reading.

Student will be provided with several research papers that will be expected to be read in detail. Robert & Casella book provides plenty of examples of implementation in R.

It is expected that every student will write 10-15 page essay based on statistical methodology introduced during lessons by following selected research papers as well as answering posed questions. The level of writing should be at the level suitable to M.Sc. thesis writing.

Upon completion of this part of the course, student will deepen its knowledge in Bayesian statistical paradigm and should be able to read some published research papers in the area and write own program to implement simple Gibbs sampler or its' extensions.

A home assignment will be provided upon completion of the lectures. The **deadline** for submission of written reports is **Monday May, 18th at 24.00**. The max amount of points from this part is 34p and it is 17p min one needs to get in order to pass.

??? part description:

??? (May 6; May 12, 18, 19)

??? part description:

(May 25, 26, and June 1)

Table 1 is a preliminary and a tentative plan for the teaching schedule. Lecturer reserves the right to make appropriate adjustments during the course.

Table 1: Preliminary plan for teaching

Lecture	Date	Content/teacher	Time/B705
F1	4May	AA+???+???: Introduction: important to attend!!	10-12
F2	07May	AA:	10:00-13:00
F3	08May	AA:	09-12
F4	11May	AA:	10-13
F5	12May	???:	13-16
F6	18May	???:	10-13

F7	19May	???:	10-13
F8	25May	???:	10-13
F9	26May	???:	09-12
F10	1June	???:	09-12
F11			
F12			
F13			

4. Examination and criteria for assessment

Exam1: three written assignments
Exam2: students can complement above assignments or will be given additional tasks by instructor(s)

Students are assessed with three home assignments that are distributed by each instructor upon completion of lectures, see schedule. Maximum number of points is 100 points. Students are expected to get at least half of the points from each of the three home assignments, i.e. getting best grade from two parts of the course and failing third part will result in overall fail mark.

1) Part I (AA): 17 points minimum out of 34 to pass this part
2) Part II (???): 16.5 points out of 33
3) Part II (???): 16.5 points out of 33

What to expect at the written exam:

The home assignment is an individual assessment: collaboration is allowed but the written report is an individual effort. Note that your submission may be tested by text matching software of TurnitIn-type to discover plagiarism. If plagiarism is established, the evaluation is set to be 0 “zero”, final grade “Fail” and no second chance given during the same term.

To pass the entire course, the student must collect at least 17 points from AA part and 16.5 points from parts ??? and ???. In other words, the student will not pass the course if he/she fails any of the three parts. Credits for home assignment cannot be moved to the next term. The grade is based on the total score. 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 should be in a proper and well-structured way to apply statistical methods and associated statistical inference that are not necessarily directly addressed in the course material. The student is also clearly able to present and interpret his/her results; explain concepts, methods and theories used in the implementation of these methods.

B (**Very good**): The student will correctly and in a well-structured way be able to apply the statistical methods and associated statistical inference that is directly addressed in the course material. The student is also clearly able to present and interpret his/her findings; explain the concepts, methods and theories used in the implementation of these methods.
C (**Good**): The student will correctly and in a well-structured way be able to apply the statistical methods and associated statistical inference that are directly
addressed in the course material. The student should also be in a good way to present and interpret his/her findings; explain concepts, methods and theories used in the implementation of these techniques.
D (**Satisfying**): The student will be able to apply statistical methods with related statistical inference that are directly addressed in the course material. The student will forward in a satisfactory way to present and interpret his/her findings; explain concepts, methods and theories used in the implementation of these techniques.
E (**Sufficient**): The student will be able to apply statistical practices directly addressed in the course material. The student, in a satisfactory way, will present and interpret his/her findings; explain the concepts, methods and theory used in the implementation of these techniques.
F (**Insufficient**): The student cannot correctly apply statistical methods that have been considered in the course.

A single final grade for the complete course will be given according to Table 3.

Table 3: The sum of the points from three home assignments and the final grade

Points	Grade
91-100	A
80-89	B
70-79	C
60-69	D
50-59	E
0-49	F

- Lectures and Examiners:

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