Syllabus
for course at advanced level

Computational Econometric Methods
Beräkningstekniska ekonometriska metoder

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	FE4141
Valid from:	Spring 2021
Date of approval:	2021-01-26
Department	Stockholm Business School
Main field:	Företagsekonomi
Specialisation:	A1F - Second cycle, has second-cycle course/s as entry requirements

Decision

This syllabus was approved by the Head of Department, Stockholm Business School, Stockholm University 2021-01-26,

Prerequisites and special admittance requirements

Bachelor's degree 180 HE credits, whereof 60 HE credits in business administration and 30 HE credits in economics or 60 HE credits in economics and 30 HE credits in business administration. 7.5 HE credits in mathematics and 7.5 HE credits in statistics. English B/English 6 or the equivalent. 52,5 HE credits from year 1 of the Master's Programme in Banking and Finance.

Course structure

Examination code	Name	Higher Education Credits
4141	Computational Econometric Methods	7.5

Course content

This course introduces students to the fundamentals of Bayesian inference and Markov chain Monte Carlo simulation methods in econometrics. Bayesian estimation techniques have become increasingly popular in finance and economics because they provide comprehensive computational methods for previously intractable or complicated estimation problems. The focus of the course is on applications in finance and economics using "real world" data, with a strong emphasis on "learning by doing". The course initially provides an overview of Bayesian statistics and econometrics, introduces Bayesian sampling algorithms such as Metropolis-Hastings and Gibbs sampling procedures, describes Bayesian estimation of State-Space Models and concludes with a variety of applications covering Bayesian VARs, time-varying parameter models with constant and time varying volatility, stochastic volatility models as well as non-linear times series models. Since the course has a highly practical nature, it provides students with advanced statistical tools for the writing of their masters' thesis. Moreover, the course offers students a solid technical foundation to proceed to the PhD program in finance and economics, as it derives the equations needed to implement the samplers for the respective models of interest.

Learning outcomes

Intended Learning Outcomes

The overall aim of the course is to equip students with modern and advanced statistical estimation techniques that can be readily implemented in their Master's thesis projects.

Upon completion of the course, students should be able to:

Knowledge and understanding

1. Define a Bayesian statistical model and understand which sampling algorithms are appropriate for the respective models of interest.

Skills and abilities

2. Derive the necessary equations of the specific econometric models to implement the various sampling algorithms that are taught in the course.

Judgement and approach

3. Evaluate the appropriateness of the specific models used in finance and economics and consult existing literature to implement and/or extend these models as required.

Education

The course consists of a combination of lectures, seminars, and computer labs, and requires a significant portion of self-study on the part of students. Assessment for the course will be continuous and is carried throughout the different activities of the course.

The course workload is 200 hours equivalent to 7,5 ECTS.

The language of instruction is English.
Please note that all teaching and learning activities - such as lectures, seminars, assignments, and assessment tasks – are carried out in English when the language of instruction is English.

Forms of examination

Assessment for the course will be continuous and is carried throughout the different course activities. Each assessment task is weighted in relation to its importance in the overall assessment of the course. The student's results from the different assessment tasks are added up to a total course score that will then translate into the final grade for the course.

Assessment tasks

The course contains the following weighted assessment tasks.

1. Individual final examination: assesses intended learning outcomes 1, 2, 3; constitutes 60% of total course points.

2. Replication assignment: assesses intended learning outcomes 2, 3; constitutes 25% of total course points.

3. Individual assignments: assesses intended learning outcomes 1, 2; constitutes 15% of total course points.

Grading

After completion of the course, students will receive grades on a scale related to the intended learning outcomes of the course. Passing grades are A, B, C, D and E. Failing grades are Fx and F. A grade Fx can be completed for a grade E.
A course comprises 0–100 course points. Receiving a final passing grade requires at least 50 course points. The scale for the final grade is tied to fixed score intervals: A: 90-100; B: 80-89; C: 70-79; D: 60-69; E: 50-59; Fx: 45-49; F: less than 45. The grades correspond to the total score points a student obtains (over a total of 100) for all the weighted assessment tasks combined as part of the continuous assessment for the course.

Each assessment task is awarded 0–100 points. The score for a single assessment task is the number of points multiplied by its percentage weight, and the combined total of score points for all weighted assessment tasks for the course are added up to a final score between 0 and 100 which then translates into a corresponding final course grade between A and F.

All assessment tasks are assessed on a 100-point scale.

The student is responsible for completing the course's assessment tasks: that a sufficient amount of course

points is earned and a passing course grade is obtained. The course's final assessment task can be taken twice: 1) during the course's first scheduled occasion; and, if a passing result (at least 50 course points) was not achieved at the first occasion, 2) at the course's second, scheduled occasion. All other assessment tasks are offered once during the course.

A passing grade (A–E) in the course is obtained when a student has achieved at least 50 course points.

A failing grade (Fx or F) in the course is obtained when a student has not achieved at least 50 course points:

• If 45–49 course points are achieved, a grade Fx is obtained, which can be completed for a grade E within 3 semester weeks after receiving instructions from the course director. If a complementary task is not completed within this time limit, and the course's two final assessment tasks have been accomplished, the course grade Fx is confirmed, implying that the student must re-register for the course and that previously acquired course points are forfeited. Note that first-time registered students have priority access to the seminar groups.

• If less than 45 course points are achieved, a grade F is obtained, implying that the entire course must be retaken and that previously acquired course points are forfeited.

Re-registration implies that:

• first-time registered students have priority access to the course's group registration;

• the final assessment task can be re-assessed without attendance at any of the course's other learning activities and without points from the course's other assessment tasks accredited.

Students receiving a passing grade may not retake the final examination or complete a previously not completed assessment task to attain a higher grade. A passing grade may not be turned into a failing grade upon the request of a student.

Assessment criteria

Assessment criteria are designed as overall assessments, combined qualitative descriptions of what the student is expected to do in order to demonstrate how well the course's learning outcomes are achieved. The assessment criteria are based upon the general abilities as expressed in the degree objectives of the Higher Education Ordinance (appendix 2, System of Qualifications). The list of abilities below is a compilation of these degree objectives. To pass the course (grade E) students should demonstrate general ability to:

• recall, understand and explain course content, the course subject and its scientific basis and methodology;

• apply course content;

• critically analyse course content;

• orally and in writing, present and discuss course content;

• assess course content in terms of scientific, social, and ethical aspects;

• relate course content to current social issues;

• meet standards of written presentation and formal accuracy.

The following assessment criteria are used to decide to what extent students have demonstrated these abilities and hence fulfil the course's intended learning outcomes, whereby a grading decision can be made. A higher grade-level presupposes the abilities at lower levels.

A (Excellent)□
The student demonstrates ability to evaluate and relate to the content of the course from a comprehensive, critically reflective perspective, as well as to transfer and apply insights in new, meaningful contexts.

B (Very Good)□
The student demonstrates ability to, from an overarching and coherent perspective of the field, understand and use concepts to explain how different aspects of the course relate to each other, interconnect and become meaningful.

C (Good)☐
The student demonstrates ability to discuss the content, tasks and complex issues dealt with in the course from several well-developed but mainly independent perspectives.

D (Satisfactory)☐
The student demonstrates satisfactory ability to discuss the content, tasks and complex issues dealt with in the course in a way that, albeit in-depth and elaborate, is decidedly one-dimensional.

E (Sufficient)☐
The student demonstrates sufficient ability to discuss the content, tasks and complex issues dealt with in the course in a way that is decidedly one-dimensional.

Fx (Fail)☐
The student's knowledge, skills and abilities display minor flaws, overall or in significant parts.

F (Fail)☐
The student's knowledge, skills and abilities display major flaws, overall or in significant parts.

Interim
If the course is discontinued, or its contents are substantially altered, students have the right to be examined according to this syllabus once per semester for three further semesters.

Limitations
This course may not be included in a degree together with a course, taken in Sweden or elsewhere, of identical or partially similar content.

Misc
Exemption from an assessment task is granted if the student presents a valid reason and a written certification (such as illness and a medical certificate), whereupon the student may re-sit the assessment task at a later date while maintaining previously acquired course points.

Application for exemption should be submitted to the Director of Studies immediately after, or during planned absences well before, the date when the assessment task is carried out. A granted exemption expires at the end of the immediately following semester.

Required reading
• Lecture notes.

• A selection of academic articles and book chapters (updated each semester, see the study guide).

Also consult the course webpage for additional information about reading material.