



Course and Examination Fact Sheet: Autumn Semester 2020

9,332: Advanced Econometric Methods

ECTS credits: 4

Overview examination/s

(binding regulations see below)

Decentral - Group examination paper (all given the same grades) (50%)

Examination time: term time

Decentral - Oral examination (individual) (50%, 15 mins.)

Examination time: term time

Attached courses

Timetable -- Language -- Lecturer

[9.332.1.00 Advanced Econometric Methods](#) -- Englisch -- [Bonev Petyo](#)

Course information

Course prerequisites

The course is designed for those with sufficient knowledge in econometrics and with interest in theoretical results. Econometrics on bachelor level is a must. The lectures "7,310: Data analytics I: predictive econometrics" (given by A. Strittmatter in HS 2019), "Microeconometrics" (M. Lechner in FS 2020) or a comparable lecture is not a must but would be highly helpful.

Learning objectives

The objective of the course is to help participants develop a thorough understanding of the most important econometric estimation techniques. In addition, the course aims at enabling the students implementing those methods. A major focus of the course will be state-of-art Machine Learning methods, which play growing role in modern empirical studies. The course gently builds on the master courses "Predictive Econometrics" (A. Strittmatter), "Microeconometrics" (M. Lechner) and/or "Machine Learning" (A.-L. Horlemann). An objective is to develop intuition for the theoretical side of familiar concepts. The methods will be implemented with the widely used statistical software R.

The lecture "Advanced econometrics" complements existing lectures on MECON/MIQEF level by giving a more theoretical and fundamental perspective, thus completing the econometrics programme on master level.

Course content

The content will cover the following topics: M estimation (nonlinear models), nonparametric and semi-parametric regression techniques, Machine Learning regression techniques (LASSO, Support vector machines, Random Forests), Machine Learning Classification methods (neural networks), Bootstrap.

Course structure

Theoretical lectures are supported by empirical lab sessions using the software R. In addition, self-study in groups aims at solving exercises and implementing procedures at home.

Course literature

Major reference: lecture script.

Additional sources:

1) The excellent book by Hastie et al. "The elements of statistical learning" (2nd edition)



- 2) The evergreen classic book "Nonparametric econometrics" by Pagan and Ullah (1999)
- 3) The wonderful book by Li and Racine (2007): "Nonparametric econometrics, theory and practice"
- 4) The handbook chapter by Newey and McFadden "Large sample estimation and hypothesis testing".

Further references will be distributed during the course.

Additional course information

In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in AS2020, the course information listed above will be changed as follows:

- The course is conducted online via the platform Zoom;
- The recordings of the course are available for 30 days;
- The lecturer informs via StudyNet on the changed implementation modalities of the course;

The examination information listed below would be changed as follows:

- There are no changes necessary to the examination information.

Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination time and form

Decentral - Group examination paper (all given the same grades) (50%)

Examination time: term time

Remark

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Examination-aid rule

Term papers

Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship which is a published template in StudentWeb.

The documentation of sources (quotations, bibliography) has to be done throughout and consistently in accordance with the chosen citation standard such as APA or MLA.

For papers in law, the legal standard is recommended (by way of example, cf. FORSTMOSER, P., OGOREK R. et SCHINDLER B., Juristisches Arbeiten: Eine Anleitung für Studierende, newest edition respectively, or according to the recommendations of the Law School).

The indications of the sources of information taken over verbatim or in paraphrase (quotations) must be integrated into texts in accordance with the precepts of the applicable quotation standard, while informative and bibliographical notes must be added as footnotes (recommendations and standards can be found, for example, in METZGER, C., Lern- und Arbeitsstrategien, newest edition respectively).

For any work written at the HSG, the indication of the page numbers is mandatory independent of the chosen citation standard. Where there are no page numbers in sources, precise references must be provided in a different way: titles of chapters or sections, section numbers, acts, scenes, verses, etc.



Supplementary aids

All auxiliary means used in writing a paper are allowed.

Examination languages

Question language: English

Answer language: English

2. Examination sub part (2/2)

Examination time and form

Decentral - Oral examination (individual) (50%, 15 mins.)

Examination time: term time

Remark

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Examination-aid rule

Extended Closed Book

The use of aids is limited; any additional aids permitted are exhaustively listed under "Supplementary aids". Basically, the following is applicable:

- At such examinations, all the pocket calculators of the Texas Instruments TI-30 series and mono- or bilingual dictionaries (no subject-specific dictionaries) without hand-written notes are admissible. Any other pocket calculator models and any electronic dictionaries are inadmissible.
- In addition, any type of communication, as well as any electronic devices that can be programmed and are capable of communication such as notebooks, tablets, mobile telephones and others, are inadmissible.
- Students are themselves responsible for the procurement of examination aids.

Supplementary aids

Closed book exam, no additional tools allowed.

Examination languages

Question language: English

Answer language: English

Examination content

Topic 1: M-estimation. Nonlinear estimation, Maximum Likelihood estimation.

Topic 2: Nonparametric and semiparametric estimation. Density kernel estimation, nonparametric and semiparametric estimation of conditional mean.

Topic 3: Machine Learning regression methods. Basic principles (out-of-sample cross validation, regularization, scalability). Supervised learning: LASSO, Ridge; asymptotic theory of LASSO.

Topic 4: Regression trees. Intuition, practice and theoretical aspects (e.g. selecting the penalty, pruning the tree, etc.). Random forests.

Topic 5: Classification methods. Empirical risk, fundamental problem of statistical learning, bayesian estimator, neural networks.

Examination relevant literature

See references under "Course literature".



Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW51) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 42 are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 34 (Thursday, 20 August 2020);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 12 October 2020);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 42 (Monday, 12 October 2020);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 44 (Thursday, 29 October 2020).