MGT-581

Introduction to econometrics

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Cursus	Sem.	Type
Financial engineering minor	H	Opt.
Financial engineering	MA1, MA3	Obl.
Management of technology		Opt.
Management, Technology and Entrepreneurship minor	H	Opt.
Managmt, dur et tech	MA3	Opt.
Managmt, tech et entr.	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

The course provides an introduction to econometrics for economics, management, and financial applications. The objective is to learn how to make valid (causal) inference from economic and social data.

Content

- Causal inference
- Linear model
- Estimation (ordinary least square, maximum likelihood)
- Inference (hypothesis testing, confidence intervals)
- Experiments and quasi-experiments
- Randomized controlled trials
- Panel data and time series
- Instrumental variable
- Nonlinear models

Keywords

Econometrics; Statistics; Data analysis; Causality; Data science; Ordinary least squares; Linear model

Learning Prerequisites

Recommended courses

Probability and statistics are recommended (but not required).

Important concepts to start the course

- Sound understanding of statistics and probability concepts
- Matrix algebra.
- Calculus
- Familarity with R (or Python) is helpful.

Learning Outcomes

By the end of the course, the student must be able to:

- Recognize pitfalls and bias in data collection and econometric models
- Explain the concept of endogeneity
- Check the validity of an econometric result
- Quantify an economic relationship
- Design an appropriate regression model
- Interpret coefficients of econometric regressions
- Carry out hypothesis testing

Transversal skills

- Demonstrate a capacity for creativity.
- Demonstrate the capacity for critical thinking
- Use both general and domain specific IT resources and tools
- Use a work methodology appropriate to the task.
- Access and evaluate appropriate sources of information.

Teaching methods

Lectures provide the theoretical content of the course. Exercise sessions deepen theoretical knowledge and develop relevant coding skills.

Expected student activities

- Attendance and participation at lectures and exercise sessions
- Submission of problem sets

Assessment methods

- Semester evaluation: 40%
- Written exam: 60%

Supervision

Office hours	Yes
Assistant.e.s	Yes
Forum	No

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

The course will be draw on (ref. not compulsory)

- James H. Stock and Mark W. Watson. 2020. *Introduction to Econometrics*. 4th Edition. Pearson.
- Verbeek, M. 2017. *A Guide to Modern Econometrics*. 5th Edition. John Wiley & Sons.
- Stachurski, J. 2016. *A Primer in Econometric Theory*. MIT Press

Additional useful references:

• Angrist, J.D. and Pischke, J.-S. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.

• Aronow, Peter M., and Benjamin T. Miller. 2019. *Foundations of Agnostic Statistics*. Cambridge University Press.

• Davidson, Russell and James MacKinnon. 2021. *Econometric Theory and Methods*. Available at the authors' webpage (http://qed.econ.queensu.ca/ETM/).

• Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hiearchical Models*. Cambridge University Press.

• Greene, W.H. 2011. *Econometric Analysis*. Prentice Hall.

• Hansen, B. 2022. *Econometrics.* Princeton University Press.

• Morgan, Steven L., and Christopher Winship. 2014. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. 2nd Edition. Cambridge University Press

• Pearl, J. 2009. *Causality (2nd ed).* Cambridge University Press.

• Wooldridge, J. 2010. *Econometric Analysis of Cross Section and Panel Data.* MIT Press.

Ressources en bibliothèque

• Find the references at the Library

Notes/Handbook

Students are provided with notes when applicable.

Moodle Link

• https://go.epfl.ch/MGT-581