Causal Inference with Observational Data

Course title – Intitulé du cours	Causal inference with observational data
Level / Semester – Niveau /semestre	M2-S1
School – Composante	Ecole d'Economie de Toulouse
Teacher – Enseignant responsable	Mateo Montenegro and Paul Seabright
Other teacher(s) – Autre(s) enseignant(s)	
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Lecture Hours – Volume Horaire CM	30
TA Hours – Volume horaire TD	15
TP Hours – Volume horaire TP	
Course Language – Langue du cours	English
TA and/or TP Language – Langue des TD et/ou TP	English

Teaching staff contacts – Coordonnées de l'équipe pédagogique :

- Paul Seabright (PS): paul.seabright@tse-fr.eu- T.480
- Mateo Montenegro (MM): mateo.montenegro@tse-fr.eu - T.354

Course Objectives – Objectifs du cours :

This course introduces students to the main research designs that can recover causal effects using observational data. It will cover the key assumptions behind each approach, how and when to implement each of them, and what their limitations are. The course also includes applications with selected papers that use causal inference methods with observational data. TA sessions will allow students to practice and test some of the theoretical properties of these methods with data.

Prerequisites – Pré requis :

Students should be familiar with the content of the compulsory M1 econometrics courses. Basic knowledge of programming with any of the popular software languages (Stata or R) is recommended. Students will have the opportunity to enhance their programming skills with the TA/TP sessions.

Practical information about the sessions – Modalités pratiques de gestion du cours :

Students should participate actively in each session. Laptops and tablets are welcome if used for the sole purpose of following the course.

Grading system – Modalités d'évaluation :

Final written exams and home assignments (problem sets)

Bibliography/references – Bibliographie/références :

This course will loosely follow the textbook "Causal Inference: The Mixtape" by Cunningham (2021) for both the lectures and the TA sessions.

- Cunningham, Scott. Causal Inference: The Mixtape. Yale University Press, 2021.

Complementary textbook references are:

- Hansen Bruce, E. "Econometrics" Wisconsin: University of Wisconsin (2020).
- Angrist, Joshua D., and Jorn-Steffen Pischke. "Mostly harmless econometrics: An empiricist's companion." Princeton University press, 2008.

Session planning – Planification des séances

1. Introduction (session 1[1])
2. Potential Outcomes and DAGs (session 1)
3. Matching (session 2)
4. Regression Discontinuity (RD) (sessions 2, 3)
5. Difference in Differences (DD) (session 4)
6. Staggered DD (sessions 4,5)
7. Instrumental Variables (IV) (sessions 5, 6)
8. Synthetic controls (sessions 7, 8)
9. Getting standard errors right (sessions 8,9)
10. Variable selection for causal inference (session 9)
11. Conclusion: What can go wrong (session 10)

Distance learning – *Enseignement à distance :*

Distance learning can be provided when necessary by implementing:

- *Interactive virtual classrooms*

- *MCQ tests and other online exercises / assignments*

- *Remote (online) tutorials (classes)*

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[1] Session planning is subject to change, depending on how the class evolves and students' interests.