

Atelier 282

Best practices and recent advances in causal analyses

Practical phase, October 13-16, 2025 - Poitiers



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Training location

Université de Poitiers
UFR SANTÉ, Bâtiment D2 (**green on the map**)
6, rue de la Milétrie, POITIERS



Public transportation

Several buses serve the University of Poitiers' Health Sciences Department: :

- Bus 10 et 13 – Stop at « Faculté de Médecine »
- Bus 1 – Stop at « Pôle Technologique »
- Bus 11 – Stop at « Petits Champs »

Hotels

Here is the closest hotel to the Faculty of Health Sciences, easily accessible by car :

- ACE Hôtel Poitiers, rue de la Maison Coupée, 86000 Poitiers

There are little entertainment and few restaurants on campus, so booking a hotel in the city centre represents an option to consider. Here are a few possible addresses:

- Logis Hôtel de l'Europe, 39 Rue Carnot, 86000 Poitiers.
- Best Western Poitiers Centre Le Grand Hôtel, 28 Rue Carnot, 86000 Poitiers.
- Hôtel Ibis Poitiers Centre, 15 Rue du Petit Bonneveau, 86000 Poitiers.

Food

We will provide coffee breaks during the day and a caterer for lunch. The other meals will be at your expense. However, we plan to reserve restaurants on Monday and Tuesday evenings for those who wish to continue the discussions. A survey will be sent to you.

For persons who booked the restaurant for Monday and/ Tuesday at 8 P.M, here are the addresses:

- Monday: La petite roquette, 21 Place Charles De Gaulle, 86000 Poitiers.
- Tuesday: Manhattan Café, 26 Place Alphonse Lepetit, 86000 Poitiers.

Scientific program

Monday, October 13, 2:00 p.m. to 6:00 p.m.

Variable selection (DAGitty)

(Karen Leffondré, Joe de Keizer, et Lisa Durocher)

In observational epidemiological studies, it is important to identify confounding factors to estimate the causal effect of exposure on the health event. There are various methods for selecting these factors, including selection based on graphs representing causal hypotheses between the different factors, exposure, and the health event (hypotheses developed from the literature and knowledge of the context). This identification strategy is implemented in the free software DAGitty. In this session, we will use concrete examples from epidemiological studies to illustrate the construction of a causal graph and its implementation in DAGitty.

Tuesday, October 14, 9:00 a.m.–1:00 p.m. and 2:00–6:00 p.m.

G-computation and propensity score weighting to estimate a marginal effect

(Yohann Foucher, Joe de Keizer, Lisa Durocher)

Weighting consists of individually predicting the probability of receiving treatment and then decreasing/increasing the contributions of overrepresented/underrepresented individuals. The G-computation consists of individually predicting the responses to treatment and then estimating the

marginal effect by averaging. We will first explain in detail the two methods. Then, we will use the methods on the same application to compare the pros and cons.

Wednesday, October 15, 9:00 a.m. to 1:00 p.m.

Mediation analysis with the R CMAverse package

(Cécile Proust-Lima)

Mediation analysis breaks down the total effect of exposure on a variable of interest into its direct effect and its effect mediated by one or more intermediate variables. We will discover the CMAverse R package, which allows mediation analyses to be performed in various contexts (different types of effects, causal diagrams and types of variables). Using concrete examples, we will discuss the assumptions underlying the identification of causal effects, implement their estimation, interpret the causal contrasts obtained, and discuss the results.

Wednesday, October 15, 2:00 p.m. to 6:00 p.m.

Mediation analyses with the ltmle and medoutcon packages

(Benoit Lepage)

The ltmle package allows you to estimate the causal effect of repeated exposures over time with three possible estimators: g-computation by iterative expectations, weighting, and Targeted Maximum Likelihood Estimation (TMLE). In the context of mediation analyses, this package can be used to estimate controlled direct effects, even in the presence of time-dependent confounding influenced by initial exposure (recanting witness). We will review the principles of double robustness estimation using TMLE and work through a simple illustrative example to understand how this package is implemented. When our objective is to estimate a natural direct or indirect effect rather than a controlled direct effect, there are fewer tools available for obtaining a double robust estimate. We will use the medoutcon package, which provides a one-step estimator and a TMLE-based estimator.

Required hardware, software, and Wi-Fi network

The Eduram network will be available. If you do not have access, we will provide you codes to access the Wi-Fi network. You must bring a laptop with the R software and the latest versions of the following packages from CRAN mirrors:

- RISCA
- CMAverse
- Superlearner
- hal9001
- medoutcon
- sl3

We will also need two more packages from GitHub:

- ltmle (<https://joshuaschwab.github.io/ltmle/>)
- gcomputation (<https://github.com/chupverse/gcomputation>)

We recommended that you have the permissions on your machine to update/install other packages.

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