

A Fully Funded PhD Scholarship

in machine learning and healthcare and disease management

We invite highly motivated candidates to apply for a [fully funded PhD scholarship](#) to join Professor Oliver Y. Chén's team (www.oliverychen.com). We work on projects related to: (a) building new [machine learning](#) and [statistical methods](#) for studying large-scale biological and medical data; (b) [disease prediction](#); (c) [digital health](#); and (d) [federated learning](#). For this PhD scholarship in particular, please see details below. The student will have joint affiliations with the [Lausanne University Hospital \(CHUV\)](#) and the [University of Lausanne](#).

I. Contexte: What does our group do?

We develop new machine-learning and statistical methods and study large-scale data in health and disease. Our data are from diverse sources, from brain imaging (e.g., MRI and EEG), sequencing, mass cytometry/spectrometry, and health records, to data from digital devices such as smartphones.

Our focus is threefold. (a) Building new, methodologically exciting [models](#) to address real-world problems; (b) using these methods to (i) study the interplays between [large-scale multimodal](#), [multivariate](#), [high-dimensional](#) features, and when/how they may be associated with [diseases](#) cross-sectionally and longitudinally and (ii) [identify markers](#) that support patient diagnosis and prognosis; (c) translating our algorithms into [clinical decision support](#) and patient health management [apps](#).

II. Mission

With this full scholarship, the PhD student(s) will primarily work on three interlinked projects in collaboration between CHUV, UNIL, and Roche Diagnostics:

1. [Discovering correlates and eventually predictors relating to disease diagnosis, treatment, and management efficacy](#). Classical machine learning methods aim at predicting the disease status, unbiasedly estimating treatment effects, or minimising disease management costs. Such approaches, however, oftentimes optimise one objective (diagnostic accuracy, treatment effect, or disease management cost) while overlooking the others. Here, we will design a framework to identify, from multivariate, potentially high-dimensional predictors, those that optimise several objectives (e.g., high prediction accuracy, effective treatment, and affordable cost) based on real-world healthcare data.
 2. [Longitudinal disease dynamics, treatment assessment and forecasting](#). Developing a new method that, retrospectively, (1) unveils the longitudinal trajectories of the disease profile, (2) forecasts future disease progression, and (3) compares the efficacy of the assigned disease treatment and management strategies.
 3. [From expert-centred healthcare to a united triad knitting patients, experts, and healthcare systems](#). Leveraging the methods from (1) and insights from (2), we (re)define “best disease outcome measure” by embracing, balancing, and integrating (a) medical experts’ consideration (diagnostic accuracy and treatment effect), (b) patient-reported outcomes, and (c) healthcare systems’ sustainability (availability and cost of care).
- The students will, if interested, [collaborate](#) with colleagues in other projects within and across teams.

- The students [have the freedom](#) to propose and develop [independent studies](#) within the broader aims of this Scholarship and collaborate with or visit other teams.
- The students will work in an [interdisciplinary, multicultural](#) environment.
- The positions, once filled, may start immediately.

III. Profile: What are we looking for?

Minimum qualifications:

- A [master's degree](#) and an [undergraduate degree](#) in disciplines relevant to (applied) mathematics, computer science, engineering, machine learning, or statistics.
- An interest in developing [new methods](#) and [applications](#) and employing them to address [real-world healthcare-related problems](#).
- An interest in [data visualisation](#).
- A [team player](#).
- The working language of the group is [English](#).

Desired qualifications:

- Strong programming skills related to machine learning, and longitudinal, many-to-many methods.
- Experience in machine learning, statistical modelling, and version control.

IV. Nous offrons: What do we offer?

- Full scholarships that cover your [tuition](#) plus an [annual salary](#) (SNF salary scale).
- Joint affiliations with the [Lausanne University Hospital \(CHUV\)](#) and the [University of Lausanne](#).
- An [interdisciplinary](#) environment, and a [supportive](#) team. We strive for [equality, diversity, and inclusion](#). Our team is interdisciplinary and multicultural, and we encourage underrepresented students to apply.
- Possibility to collaborate with and visit [external colleagues](#) at F. Hoffmann-La Roche, Johns Hopkins University, KU Leuven, University of Bristol, University of Oxford, University of Pennsylvania, Vrije Universiteit Brussel, and Yale University.
- Access to [courses](#) from the CHUV and the University of Lausanne.

V. Contact et envoi de candidature: How to apply?

Please send Professor Oliver Y. Chén (olivery.chen@chuv.ch) the following.

1. A motivation letter (no more than one page).
2. A CV.
3. Copies of your undergraduate and master's theses.
4. Contact information for three references.