Einführung in die Kausale Inferenz für Biologen / Introduction to causal inference for biologists

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The project introduced biology students and researchers to causal inference methods. As causal inference is a rapidly developing field, we decided to narrow our focus to the use of structural equation modeling (SEM), a framework that has its roots in the natural sciences (i.e., path analysis introduced by Sewall Wright in 1921). Although interest in SEM diminished over time in the natural sciences, SEM was heavily developed and applied in the social sciences and psychology in the meantime. Since the early 1990's, SEM has regained the attention of natural scientists due to its ability to draw causal inferences from observational data and has seen a quick rise in popularity.

We invited Dr James Grace, one of the world leaders in the application of SEM in the environmental sciences, to teach the SEM framework in a one-week long workshop in 2019 at the University of Zurich, in which the project leaders Dr Frank Pennekamp and Dr Debra Zuppinger-Dingley participated. Besides teaching, the project leaders and Dr Grace devised a roadmap to be able to transfer the acquired SEM knowledge to new learners in Switzerland by designing a SEM course that would provide an introduction to SEM as well as building a community to local SEM users.

In 2020, the project leaders organized a workshop that laid the foundation for a community of SEM practitioners and teachers in Switzerland. A group of experienced SEM users from the natural sciences was recruited from a range of Swiss universities and research institutions (University of Zurich, University of Bern, University of Fribourg, Agroscope, EAWAG) who are dedicated to passing on their knowledge in the application of the SEM framework. Due to the COVID-19 pandemic, the workshop was held entirely remotely. At the workshop, teaching materials for a three-day SEM course were discussed and designed. From the start, the workshop built on tools, such as R Markdown, to collectively develop teaching materials based on Open Science principles such that all members of the community could collectively edit and develop the materials. During 2021, the course materials were then implemented, notably by Dr Rachel Korn and Dr Frank Pennekamp. All teaching materials including slide decks, exercises and solution documents are freely available on Github (https://github.com/pennekampster/Swiss_SEM). Based on the teaching materials, the first edition of the introductory course was taught at the University of Zurich from the 9-11 November 2021 by Dr Frank Pennekamp, supported remotely by Dr James Grace. The course was very positively received by the participating students.