



| Module Title                      |   | Scientific methods 2: quantitative analyses |
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| Code                              | MCCf423   |   |
| Degree Programme                  | Master of Science – Circular Innovation and Sustainability  |   |
| ECTS Credits                      | 3   |   |
| Workload                          | 90 hours <ul style="list-style-type: none"> <li>• 14 hours contact teaching</li> <li>• 76 hours self-study</li> </ul>   |   |
| Module Coordinator                | Name: <a href="#">Prof. Dr. Stefan Grösser</a><br>Phone: +41 (0) 32 321 62 75<br>E-mail: <a href="mailto:stefan.groesser@bfh.ch">stefan.groesser@bfh.ch</a><br>Address: BFH – TI, Quellgasse 12, 2502 Biel-Bienne   |   |
| Lecturers                         | <ul style="list-style-type: none"> <li>• <a href="#">Prof. Dr. Gernot Pruschak</a>; Business School</li> </ul>  |   |
| Entry Requirements                | None  |   |
| Learning Outcomes and Competences | <p><b>Competences</b></p> <p>After completing the module, students will be able to:</p> <ul style="list-style-type: none"> <li>• understand the importance of quantitative data analysis;</li> <li>• clean and structure the data;</li> <li>• perform descriptive statistical analysis with respect to the topic of their concentration;</li> <li>• know the elementary methods of quantitative data analysis;</li> <li>• understand the utility of multiple linear regression analysis compared to descriptive statistics;</li> <li>• independently identify which method is most appropriate in which situation and be able to apply it concretely;</li> <li>• conceptualize a dynamic problem suitable for systems analysis;</li> <li>• apply a systems analysis approach to small scale problems;</li> <li>• ensure the validity of a system dynamics simulation model with a defined set of validation tests.</li> </ul> <p><b>Outcomes</b></p> <p>After completing the module, students will be able to:</p> <ul style="list-style-type: none"> <li>• reflect on issues/problems when applying data analysis methods;</li> <li>• apply statistical analysis and causal simulation modelling to adequate topics in the context of sustainability.</li> </ul> |   |
| Module Content                    | <p>The module offers a hands-on application-oriented approach to gathering, structuring, clearing, visualizing, and analysing of quantitative data. In addition to lectures, hands-on self-study exercises are provided during which students apply the defined methods themselves to their methods-oriented projects.</p> <p>First, it will be addressed why quantitative statistical methods became more important in recent years and decades and where they can be applied. Second, a systems analysis highly suitable for the topic of sustainability analysis is addressed. Third, data cleaning and structuring approaches are explained. Fourth, essential elements of descriptive statistics are reviewed (distribution, central tendency, dispersion, correlation). Fifth, methods for hypothesis testing and group comparisons will be introduced.</p>   |   |

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|  | For the module the open-source software R-Studio is used for one part of the module. The complementing part uses a simulation software for system dynamics models. Students are expected to build a basic understanding programming in such a way that the software can be used. The module covers the usage of R for this module at the beginning of the module. Each student needs to have an own laptop for this module. |
| <b>Teaching / Learning Methods</b>         | <ul style="list-style-type: none"> <li>• Flipped classroom</li> <li>• Project-based learning</li> <li>• Individual exercises</li> <li>• Learning videos</li> </ul>  |
| <b>Assessment of Learning Outcome</b>      | <ul style="list-style-type: none"> <li>• Written work, assignments (70%)</li> <li>• Mini quizzes (30%)</li> </ul>   |
| <b>Conditions of assessment repetition</b> | <p>In case of failure, students can either:</p> <ul style="list-style-type: none"> <li>• Realise new assignments defined by the module coordinator at next re-examination period.</li> <li>• Retake the full module next time it is offered.</li> </ul> <p><b>NB: in MSc CIS, failed modules can only be repeated once!</b></p>   |
| <b>Format</b>                              | 2 lessons per week over 7 weeks   |
| <b>Attendance &amp; Compulsory session</b> | Not compulsory  |
| <b>Timing of the module</b>                | Spring Semester   |
| <b>Venue</b>                               | On-site   |
| <b>Location</b>                            | Bern  |
| <b>Bibliography</b>                        | <ul style="list-style-type: none"> <li>• Schaffernicht, M.; Grösser, S. (2018). <i>Growth Dynamics in New Markets</i>. Wiley Publishing.</li> </ul>   |
| <b>Language</b>                            | English   |
| <b>Links to other modules</b>              | <ul style="list-style-type: none"> <li>• MCCf013 Introduction to circular economy</li> <li>• MCCf413 Research methods 1: qualitative approaches</li> <li>• MCCf433 Research methods 3: transdisciplinary approaches</li> <li>• MCCf443 Impact assessment</li> </ul>   |
| <b>Last Update</b>                         | May 2023  |