

Storybook of Lectures

General skills (coordination: Lenka Fehrenbach)

KN1: Communication techniques (2h)

Lecturer: Dr. Annie Cottier Bucher, Jasmin Fallahi

Join us for a session on the inspiring and interesting topic of intercultural learning and communication. The class is aimed at supporting you in developing your intercultural learning skills, and encourages you to be critical about your views on the culture and society of your host and your home country. We will discuss your expectations for the summer school, learn about complex terms such as culture and interculturality, and reflect on how you can benefit most of your two weeks with fellow students from all over the world at the University of Bern.

Physical climate system (coordinators: Christoph Raible and Jörg Franke)

KN2: IPCC Working Group I - current state of knowledge (1.5 h)

Lecturer: Prof. Thomas Stocker

The lecture presents the important results of the latest assessment reports of the Intergovernmental Panel on Climate Change published in 2021. These reports support the United Nations Framework Convention on Climate Change, which is the main international treaty on climate change. The report of Working Group I assesses the current physical understanding of the climate system and the potential future change. The students will learn about what climate scenarios are and how under certain scenarios the climate will evolve in future. Thus, the educational objectives are to obtain an overview of the current understanding of climate and its potential future change. Additionally, insights of the process on how the report was generated and which role IPCC Panel composed of representatives appointed by governments have will be presented.

References

IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte et al. (eds.)]. In press. [available at <https://www.ipcc.ch/report/ar6/wg1/>]

KN3: Climate impacts and climate risks (1.5 h)

Lecturer: Prof. Olivia Romppainen-Martius

The notion of climate risks arising from a combination of hazards, vulnerability and exposure is introduced. We start with an overview of major weather and climate hazards and their evolution in a changing climate. The hazard view is then expanded to include a discussion of

vulnerability and changes in exposure. Finally, we analyze implications for adaptation measures and uncertainty estimates.

References

IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

KN4: Basics on statistical methods and modeling (1h)

Lecturer: Dr. Jörg Franke / Prof. Christoph Raible

Models have limitations as they are simplifications of reality. Thus, it is essential to assess their quality by (i) analyze the variability represented in a model and (ii) evaluate the model's ability to predict a future state. To do so, observations are inevitable prerequisite. Still, also observations have limitations and, thus, a brief overview will be given first. It is also important that observations are completely independent from the forecast because often observations are already used to fit parameters of model (e.g. regression coefficients). The concepts of cross-validation and leave-one-out validation are discussed. These two methods are used to avoid so-called "overfitting", which would make us believe that the model forecast is better than is actually is.

The second part of the lecture will introduce statistical methods to verify predictions on, e.g., the weather time scale or longer times scales up to several seasons; the latter being important for the most important mode of climate variability ENSO. Forecasts are preferably accurate, unbiased and sharp. The main focus in this lecture are basic measures like correlation, bias or root mean squared error. However, not all meteorological measures are metric and Gaussian, e.g. precipitation. Concepts are introduced how to deal with discrete or binary data (e.g. precipitation vs no precipitation). Additionally, forecast accuracy is often checked with so-called "skill scores". These are a relative measure that compare for instance how much better a forecast is compared to the climatology, the assumption that the climate state will be simply average. Especially if multiple forecasts are available, more advanced measures are commonly used. Therefore, concepts of like rank histograms, error-spread ratios are introduced.

References

Jolliffe I. J., D. B. Stephenson, 2011: Forecast Verification: A Practitioner's Guide in Atmospheric Science, 2nd Edition, 292pp.

Wilks D. S., 2005, Statistical Methods in the Atmospheric Sciences, Volume 100, International Geophysics Series, 2nd Edition, 648pp.

Climate Governance and Law (coordinator: Manfred Elsig)

KN5: Theories of Climate Governance (1.5 h)

Lecturer: Prof. Manfred Elsig

The lecture focuses on the role of international cooperation in climate governance. It reviews past experiences and addresses the current challenges at the international level focusing in particular on the Kyoto Protocol and the Paris Agreement. It also touches on the main theories of international relations (realism, liberalism and social constructivism) and their application in regards to climate governance and discusses selected research on the optimal design of multilateral climate treaties.

References

Grieco Joseph et al. 2015. "The Environment and International Relations". In Introduction to International Relations, edited by J. Grieco, J. Ikenberry and M. Mastanduno, London: Palgrave, 388-415.

KN7: International trade law and climate governance (1h)

Lecturer: Prof. Peter Van den Bossche

The lecture addresses the question whether the rules of international trade law affect national climate change policies. The lecture focuses primarily on the basic rules of non-discrimination, market access and subsidies and how these rules either promote or undermine the efforts by States to address climate change.

References

Peter Van den Bossche and Denise Prévost, *Essentials of WTO Law* (Cambridge University Press, 2016), 13-112.

Climate Economics (coordinator: Eric Strobl, Ralph Winkler)

KN8: Challenges of carbon neutral energy supply (1.5 h)

Lecturer: Prof. Doina Radulescu

This lecture describes a pathway to achieve a net zero energy system at the global level as suggested by the International Energy Agency (2021). Reducing global CO₂ emissions to net zero by 2050 is consistent with efforts to limit the long-term increase in average global temperatures to 1.5 °C. This calls for a complete transformation of how we produce, transport and consume energy. The lecture focuses on topics such as energy efficiency, the role of renewables but also on strategies for particular sectors of the economy such as the transport sector or the power sector. We also consider the effects of energy policies such as carbon taxes or emission permits in addressing negative environmental externalities.

References

International Energy Agency (2021): Net Zero by 2050: A Roadmap for the Global Energy Sector

KN9: Linking Trade Policy and Climate Policy (1.5h)

Lecturer: Prof. Joseph Francois

We have witnessed two related processes in recent decades that have greatly transformed the world economy. These changes pose challenges in the inter-linkages between global and local economic activity and the environment. One is the geographic disintegration and delocation of production with the emergence of international production networks. The other is changes in the institutional architecture governing related trade and investment flows since the early 1990s. In this lecture we provide an overview of global trade linkages, their relationship to carbon management, and the sometimes-conflicting interactions between trade policy objectives and environmental ones. Students will be introduced to the concept of global carbon accounting, wherein we trace for example the carbon emitted in various stages of production -- for example steel, rubber, and plastics that feed into production of an automobile. This will include the concept of assigning carbon to where it is consumed rather than produced. We will also examine the balance between environmental and economic (trade) policy within the WTO system. This includes tariffs against imports of solar panels, and the economics underpinning the application of international trade rules (and consistency with those rules) when implementing environmental policies. An example here is border tax adjustment in carbon pricing regimes, and the legitimacy of clean air as a trade policy objective.

References

- Baldwin, R. E. (2011), 'Integration of the North American Economy and New-paradigm Globalization', in A. Sydor (ed.), *Global Value Chains: Impacts and Implications* (Ottawa: Government of Canada), 43–76.
- Baldwin, R. E. (2014), 'Trade and Industrialisation After Globalisation's Second Unbundling: How Building and Joining a Supply Chain Are Different and Why It Matters', in R. C. Feenstra and A. M. Taylor (eds.), *Globalization in an Age of Crisis: Multilateral Economic Cooperation in the Twenty-first Century* (Chicago, IL: University of Chicago Press/NBER) 165–212.
- Dür, A., Baccini, L., & Elsig, M. (2014). The design of international trade agreements: Introducing a new dataset. *The Review of International Organizations*, 9(3), 353-375.
- Hillman, Jennifer. 2013. *Changing Climate for Carbon Taxes: Who's Afraid of the WTO?* Climate and Energy Paper Series. Washington, DC: German Marshall Fund of the United States. Hillman is a former member of the WTO Appellate Body.
- Horn, Henrik and Petros C. Mavroidis. 2011. "To B(TA) or not to B(TA)? On the Legality and Desirability of Border Tax Adjustments from a Trade Perspective." *The World Economy* 34 (11): 1911–37.
- Pauwelyn, Joost. 2012. Carbon Leakage Measures and Border Tax Adjustments under WTO Law. In *Research Handbook on Environment, Health, and the WTO*, ed. Denise Prévost and Geert Van Calster (Cheltenham, UK: Edward Elgar), 448-506.