For the WiSe 2021/2022 the Geographical Institute currently plans the teaching in a digital format, i. e. content which is relevant for the examination is offered digitally. Depending on the development of the Corona situation, it may happen that – in addition – face-to-face teaching is offered on the RUB campus or as field trips. The lecturers will arrange these possible additional offers with their students.
Further updates will regularly follow in the catalogue of courses.

Bachelor (Elective Modules, 6 CP)

170093 **Spationomy**
Seminar, 3 SWS — Registration via carsten.juergens(at)rub(dot)de — *Jürgens, Carsten; Moos, Nicolai; Redecker, Andreas. P.*

Description:

6 participants
Block seminar: 03 - 10 Nov 2021 in Maribor, CZ

170103 **Introduction to programming and applied statistics**
Seminar, 2 SWS — Registration online, 28 Jun-2 Jul 2021 (via website "Studinews") — *Sismanidis, Panagiotis*

Description:

Asynchronous

WiSe 2021: Introduction to programming and applied statistics		
Veranstaltungs-Nr. 170103	**Zeit, Ort** Asynchron, online	**Dozent** Panagiotis Sismanidis
Lehrveranstaltungsart Seminar	**Anmeldung** Anmeldung vom 28.06.-02.07.2021 internetgestützt über GI-Seite ("Aktuelles")	**Prüfungsform** Final project
Voraussetzungen Basic knowledge in statistics.		
Zielgruppe Undergraduate students without any prior experience in programming using python. Students who want to specialise in climatology are strongly recommended to take this course!		
Ziele • Basic knowledge about fundamental methods in sciences, in particular, processing of large research datasets. • Acquire programming skills in core Python 3. • Identify and manipulate Python objects. • Writing effective python scripts that are consistent and easy-to-read. • Open, read, process, analyze and write data using Python and Pandas. • Designing clear and effective data visualizations using Python.		
Inhalte This course consists of two parts. The first introduces the students to the fundamentals of the Python language and the second to data analysis and visualization with Python.		

First Part:

- Introduction to the fundamentals of the Python language (built-in datatypes and functions, import statements, python environments etc.)
- Flow control using conditional statements and loops.
- Definition of functions in Python.
- Working with datetimes.
- Opening, reading, and writing files using python.

Second Part:

- Analysis of different research datasets from physical geography
- Introduction to the Pandas Data Analysis Library.
- Working with arrays using the NumPy Module.
- Visualizing data using Matplotlib.

Aufbau

The course consists of 12 lectures, 8 of which are dedicated to introducing the fundamentals of Python and 4 to data analysis and visualization. Each lecture includes a set of compulsory assignments that are not graded. To complete this course the students, have to prepare a final project that includes several programming tasks.

Literatur

1. The Python Tutorial: https://docs.python.org/3/tutorial/
2. Python documentation: https://docs.python.org/3.7/
3. The Coder's Apprentice: Learning programming with Python 3 (Free Ebook): http://www.spronck.net/pythonbook/pythonbook.pdf

Master (Elective Modules, 6 CP)

170093 **Spationomy**

Seminar Registration via carsten.juergens(at)rub(dot)de *Jürgens, Carsten*
3 SWS *Moos, Nicolai*
Redecker, Andreas. P.

Description:

6 participants
Block seminar: 03 - 10 Nov 2021

170096 **Microeconomics of Competitiveness: Firms, Clusters and Economic Development**

Seminar Mon 2-5 pm First session: 11 Oct *Kiese, Matthias*
3 SWS Registration online, 28 Jun-2 Jul 2021 (via website "Studinews") *Rohde, Simon*

WiSe 2021/22: Microeconomics of Competitiveness: Firms, Clusters and Economic Development		
Veranstaltungs-Nr. 170096	**Zeit, Ort** synchron, Mo 14-17	**Dozent*in** Kiese, Rohde
Lehrveranstaltungsart Seminar	**Anmeldung** Anmeldung vom 28.06-02.07.2021 internetgestützt über GI-Seite ("Aktuelles")	**Prüfungsform** Hausarbeit

Prerequisites

Fluency in English

Target Group

Graduate and PhD students

Course Objectives

Microeconomics of Competitiveness (MOC) is a graduate course created in a multiyear development effort by Professor Michael E. Porter and the staff and affiliates of the Institute for Strategy and Competitiveness at Harvard Business School. The MOC course explores the determinants of competitiveness and successful economic development viewed from a bottom-up, microeconomic perspective. While sound macroeconomic policies, stable legal and political institutions, and improving social conditions create the potential for competitiveness, wealth is actually created at the microeconomic level. The sophistication and productivity of firms, the vitality of clusters, and the quality of the business environment in which competition takes place, are the ultimate determinants of a nation or region's productivity.

Course Contents

The course has been designed not only for students at Harvard but as a platform that can be taught at universities throughout the world. The course platform consists of case studies and other written materials plus an extensive library of video content that can be used in class including lectures by Prof. Porter for all sessions and videotapes of case protagonists including heads of state, senior ministers, governors, and others.

Following Harvard's tradition, the course is based on case studies only. Each session deals with a particular company, region or country case investigating the drivers of competitiveness. As preparation for each session, all students are required to read the respective case of approx. 20 cases. A three-hour session will typically include case discussions in small and large groups, audio-visual inputs featuring Prof Porter and case protagonists, as well as a brief lecture input introducing the key theoretical concept illustrated by the case. As coursework, groups of up to four students prepare a case study analysing the competitiveness of a cluster of their own choice. The best paper will be submitted for a competition with student papers from more than 100 universities world-wide teaching the MOC course.

For further information, see http://www.geographie.ruhr-uni-bochum.de/studium/moc

Course Structure

- Competitiveness: Overall Framework
- Competing Across Locations & Global Strategies for Multinational Corporations
- The Diamond Model of Competitive Advantage
- Clusters and Cluster Development
- Institutions for Collaboration
- Economic Strategy for Countries at Different Levels of Development, Regions and Cities
- Creating Shared Value (CSV): The Corporate Role in Social and Economic Development
- Team Project Presentations
- The Process of Economic Development
- Putting Porter into Perspective: Criticism and Alternative Perspectives on Competitiveness

Readings

Porter, M. E., 2008: On Competition. (=The Harvard Business Review Book Series). Boston: The Harvard Business School Publishing.
Porter, M.E.; Kramer, M.R., 2011: Creating Shared Value. In: Harvard Business Review, 89(1), S. 62-77.
Porter, M.E.; Takeuchi, H.; Sakakibara, M., 2000: Can Japan Compete? Basingstoke: Macmillan.

170131 **Green Infrastructure Planning: Frontiers and Case Studies**
Seminar Thu 2-5 pm First session: 14 Oct *Wang, Jingxia*
3 SWS Registration online, 28 Jun-2 Jul 2021 (via website "Studinews")

WiSe 2021/22: Green Infrastructure in Metropolitan Regions		
Veranstaltungs-Nr. 170131	**Zeit, Ort** Thursday, 14:00-17:00	**Dozent*in** Jingxia Wang
Lehrveranstaltungsart Seminar	**Anmeldung** Anmeldung in der Wahlwoche vom 28.06.-02.07.2021 internetgestützt über GI-Seite ("Aktuelles")	**Prüfungsform** Written report

Voraussetzungen

Basic knowledge in GIS tools

Zielgruppe
MSc students

Ziele

The aim of this module is +to introduce the recent evolution of the concept of green infrastructure in the science and policy, and to provide students opportunities to learn environmental analysis methods to support green infrastructure planning in metropolitan regions. Students will be taught in a **project-based approach** in which they will conduct their own assessment of green infrastructure in Ruhr metropolitan areas. The course will be held in English.

Inhalte

The course will cover socio-economic, socio-cultural, socio-ecological and human health dimensions of urban green infrastructure through a mix of **theories, case-studies and project-based exercises**. Students will learn about major concepts and applicable methods in

landscape and urban ecology research. To use and master at least one spatial analysis tool in Ruhr metropolitan areas is the goal of the final **leaning-by-doing** excursion and exercise.

The course is structured in different pedagogical phases: *theoretical learning*, *methodological illustration* and *project-based learning*. It is thus composed of three parts: (i) understand relevant concepts, principles and characteristics of green infrastructure, (ii) learn quantitative methods in urban green infrastructure planning (e.g. include ArcGIS models, and MSPA software), (iii) use integrated methods to assessing and mapping urban green infrastructure in areas that have been visited during the excursion.

In the final report, the students will present and discuss the connectivity or the multifunctionality of green infrastructure in the case study area they visited, understood and evaluated. They are also flexible to choose their favorite tool introduced in the course. Groupwork in teams of *up to three* students is permissible.

The course will conclude by discussing the kinds, spatial distribution and multiple functions of green infrastructure in the Ruhr area case studies. By the end of this course, students will know key frontiers in landscape and urban ecology research around green infrastructure in metropolitan regions, and they will have acquainted essential skills for spatial analyses to support landscape planning.

Aufbau

Regular online meetings and presentations

Literatur

Albert, C., Schröter, B., Haase, D., Brillinger, M., Henze, J., Herrmann, S., Gottwald, S., Guerrero, P., Nicolas, C. and Matzdorf, B., 2019. Addressing societal challenges through nature-based solutions: How can landscape planning and governance research contribute?. Landscape and urban planning, 182, pp.12-21.

Hansen, R. and Pauleit, S., 2014. From Multifunctionality to Multiple Ecosystem Services? A Conceptual Framework for Multifunctionality in Green Infrastructure Planning for Urban Areas. Ambio, 43(4): 516-529.

Wang, J. and Banzhaf, E., 2018. Towards a better understanding of Green Infrastructure: A critical review. Ecological Indicators, 85: 758-772.

Wang, J., Pauleit, S., Banzhaf, E., 2019. An integrated indicator framework for the assessment of multifunctional green infrastructure — Exemplified in a European city. Remote Sensing, 11 (16), 1869. https://doi.org/10.3390/rs11161869

Wang, J., Xu, C., Pauleit, S., Kindler, A. and Banzhaf, E., 2019. Spatial patterns of urban green infrastructure for equity: A novel exploration. Journal of Cleaner Production, 238, p.117858.

170145 **Research Laboratory**

Seminar Registration individually *all lecturers in the*
3 SWS *M. Sc. program*

Description:

Time: individually
If you are interested in conducting your own project, please contact the lecturer of your choice directly via e-mail. More information can be found in the Modulführer on the website (see Modulbeschreibung).

Research Laboratory

Module No. 170145	Credits 6 CP	Workload 180 h	Semester every semester	Cycle every semester	Duration 1 Semester
Courses Lab Course			**Contact hours** Individual schedule depending on the project	**Self-Study** Individual schedule depending on the project	**Group Size** Individual Groups compiled by project interest

Participation Requirements

All students participating in the module are enrolled as master students.

learning outcomes

Having successfully passed the module, the students

- are able to follow meetings of research-projects and to discuss selected research topics with research fellows of the respective groups.
- are able to obtain suitable data and to apply modern digital methods of geography to current research questions of geography.
- are able to sum up their project findings in suitable texts (reports) and in workshop presentations (posters or talks)

Content

The course is designed to allow students to deal with individual current academic questions of geography in a research-based format. To conduct individual projects, students are assigned to a researcher (mentor) of RUB's Geography Department, depending on the interest and individual agreements (meeting the conditions mentioned above). During the semester, students are integrated in current research projects and, based on specific research questions arranged with the mentor, they conduct their project. The student projects concern a question of foundational or applied research that addresses a specific question of geography. The students bring together and extend theoretical and methodological skills learned in their previous studies.

Forms of teaching

Individual appointments with mentor (incl. team-meetings and lab work)

Examination methods Practical project and presentation.
Preconditions of awarding credit points Passed exam
Integration of module (in all study curricula)
Weight of module grade for final grade 6/120
Person in charge of the module, current lecturers Persons in charge of the module: Prof. Dr. Andreas Pflitsch & Dr. Dennis Edler Teaching staff: All current researchers of the Geography Department (Professors, Senior Lecturers and Post-Docs)
Other information **---**

170148 **Bochum International Seminar on the Transformation of Urban Spaces (BISTUS X)**
Seminar N.N.

Description:

http://www.geographie.ruhr-uni-bochum.de/studium/bistus/
Information on the period and registration in the winter semester will follow.

170150 **Bochum Urban Climate Summer School**
Seminar 5 participants, Application via BUCSS website *Bechtel, Benjamin*
2.5 SWS https://www.climate.ruhr-uni-bochum.de/bucss/

Description:

Decision on implementation in general and timing of implementation depending on the infection situation, information will follow.

170151 **Introduction to the Remote Sensing of Earth-Surface Temperatures**
Seminar Wed 2-4 pm First session: 13 Oct *Sismanidis, Panagiotis*
2 SWS Registration online, 28 Jun-2 Jul 2021 (via website "Studinews")

WiSe 2021: Introduction to the Remote Sensing of Earth-Surface Temperatures		
Veranstaltungs-Nr. 170151	**Zeit, Ort** Synchron, Mi 14-16	**Dozent** Panagiotis Sismanidis
Lehrveranstaltungsart Lectures and Seminars	**Anmeldung** Anmeldung vom 28.06.-02.07.2021 internetgestützt über GI-Seite („Aktuelles“)	**Prüfungsform** Final project

Voraussetzungen

Basic understanding of remote sensing principles, sensors, and methods.

Zielgruppe

Postgraduate students that want to become experienced in measuring and analyzing the surface temperature of Earth’s land and water surfaces using thermal remote sensing.

Ziele

- Understand the physics of retrieving Earth’s surface temperature from space.
- Realise the difference and complementarity of satellite and in-situ temperatures.
- Build understanding of the relationships of different surface temperatures.
- Enable spatial and temporal thinking to relate thermal remote sensing to real-world applications.
- Gain experience in literature review.

Inhalte

Lectures:

1. Recap of Remote Sensing Basics
2. Thermal Infrared Radiation, Spectral Emissivity, and Land Surface Temperature (LST) retrieval
3. Sea Surface Temperature (SST)
4. Working with remote sensing data in Python3

Seminars:

1. Satellite instruments, data interpretation, and science applications using surface satellite thermal data. (Literature review)
2. Relationship between LST and other surface and atmospheric variables (Literature Review and Data visualization)
3. Ice Surface Temperatures (ICT) in the Arctic Region (Literature review)
4. Aggregating multi-year LST using model fitting technics. (Practical using Python)
5. Using machine-learning to downscale Land Surface Temperatures (Practical using Python)
6. Remote Sensing of Urban Climates (Literature review)

Aufbau

The course consists of 4 lectures and 6 seminars dedicated to thermal remote sensing for measuring and analyzing the surface temperatures of the Earth. To complete this course the students, have to prepare a final project in groups. The topic of the final project can be tailored to the interests of each group and range from literature review, data visualization, or data processing using python or GIS.

Literatur

4. Glynn, H.; Ghent, D. Taking the Temperature of the Earth: Steps Towards Integrated Understanding of Variability and Change, 1st ed.; Elsevier: Amsterdam, 2019.
5. Merchant C. J. et al. The surface temperatures of Earth: steps towards integrated understanding of variability and change. Geosci. Instrum. Method. Data Syst., 2, 305–321, 2013

170153 **Ecosystem Services in Urban Areas**
Seminar Mon 4-6 pm First session: 11 Oct *Albert, Christian*
3 SWS Registration online, 28 Jun-2 Jul 2021 (via website "Studinews") *Romelli, Claudia*

WiSe 2021/22: Ecosystem Services in Urban Areas		
Veranstaltungs-Nr. 170153	**Zeit, Ort** Live online Monday 16-18	**Dozent*in** Christian Albert Claudia Romelli
Lehrveranstaltungsart Seminar	**Anmeldung** Anmeldung in der Wahlwoche internetgestützt über GI-Seite ("Aktuelles")	**Prüfungsform** Seminar paper

Voraussetzungen
All students participating in the module are enrolled as master students.
formal: ---
content-related: Fundamentals of physical geography (landscape ecology, vegetation, climate, vegetation, soil and water (on a bachelor level) are expected

Zielgruppe
Master students interested in gaining advanced understandings of the scientific concept of ecosystem services in urban areas, and how the concept can be applied in spatial planning and governance

Ziele
Having successfully passed the module, the students

- Have gained a deep understanding of the theory of ecosystem services,
- Are familiar with the classification systems of ecosystem services, and their different applications,
- Have studied a selection of international case study papers of urban ecosystem service applications, including the application of ecosystem services in planning and governance of green infrastructure and nature-based solutions
- Can soundly comment on synergies and trade-offs of ecosystem services,
- Have gained methodological skills to develop and implement an small research project on ecosystem services,
- Have gained experience in reading, understanding and writing scientific manuscripts on ecosystem services.

Inhalte

- Historical pathways to ecosystem services theory and applications,
- Fundamentals of ecosystem functioning, ecological capital and natural resources,
- Relations between the concepts of ecosystem services, green infrastructure and nature-based solutions
- methods for identifying, assessing and quantifying urban ecosystem services,
- the role of participation in the assessment and valuation of urban ecosystem services,
- opportunities and limitations of social and economic valuation,
- options for integrating ecosystem services in urban planning and governance,
- insights into contributions of the ecosystem services concept to transformations.

Aufbau
The seminar will take place online in the winter semester 2021/2022 and it will involve both asynchronous learning performed individually at a chosen time in preparation of the meetings, as well as joint synchronous learning via videoconferencing.

Literatur

Geneletti, D., Cortinovis, C., Zardo, L., Adem Esmail, B. (2020): Planning for ecosystem services in cities. Springer.

Von Haaren, Lovett, AA., Albert, C. (2019) Landscape planning with ecosystem services. Theories and methods for application in Europe. Springer.

TEEB (2011). TEEB Manual for Cities: Ecosystem Services in Urban Management. The Economics of Ecosystems and Biodiversity (TEEB): Geneva.