



TU Austria Summer School Doc+
18. – 22. September 2023, Leoben

TU Austria: In 2010 the three Austrian Universities of Technology – the Vienna University of Technology, the Graz University of Technology, and Montanuniversität Leoben – founded "TU Austria". This association, which focuses on the field of science and engineering, has more than 46.500 students, 5.500 graduates and 9.600 members of staff. The TU Austria universities join forces and use synergy effect in order to accomplish more in research, teaching and higher education policy and to be convincing as a strong partner in the industrial and economic sectors with their cumulative expertise.

TU Austria Summer School Doc+ Program

TU Austria Summer School Doc+ 2023 will focus on different aspects of networks. offers a great opportunity to get in touch with methods for Network Design. You will look at networks from different perspectives, technical, systemic, social. You will learn how to address design questions systematically and develop creative solution approaches for various challenges. Additionally, you will increase your team skills and benefit from exchanging information and experience with fellow students from the TU Austria universities.

Target group: PreDoc students from the three Austrian universities of technology (TU Wien, TU Graz, Montanuniversität Leoben)

During the summer school the concepts of several Network Design approaches will be elaborated. The working language is English.

Overview of the Program:

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Kick-Off	Challenges of today's industries	Workshop I	Workshop II	Final Pitch
<p>-Welcome Address</p> <p>-Key-Note Prof. János Kertész, csh – (requested)</p>	<p>-Neural Networks Elmar Rückert, Montanuniversitaet</p> <p>-Energy Networks Thomas Kienberger, Montanuniversitaet</p> <p>-Supply Chain Networks Helmut Zsifkovits, Montanuniversitaet</p>	<p>-Networks in logistics Peter Umundum, Post AG</p> <p>-Application for Sustainable Factory Design Decomposition (SFDD) Erwin Rauch + Ali Bataleblu, Free University of Bozen-Bolzano</p> <p>-Model-based Systems Engineering (MBSE) with Cameo Systems Modeler Ali Bataleblu</p>	<p>A network approach with Design Thinking Hemma Bieser, avantsmart</p>	<p>-Presentation & Award for the best concepts</p>
<p>-Field Trip "Zentrum am Berg"</p>	<p>-Due Dilligence Franz Schwammenhöfer, Federal Ministry for Climate Action</p> <p>-Networks in steel industry Thomas Bürgler, voestalpine AG</p> <p>-Team formation & identification of team topics</p> <p>-Introduction to Axiometric Design Erwin Rauch, Free University of Bozen-Bolzano</p>			
-Social Dinner	-Social networks in practice			

Dates & Location:

18. – 22. September 2023

Montanuniversität Leoben, Franz-Josef-Straße 18, 8700 Leoben

Kick-Off

Content:

Starting with a warm welcoming and an introduction to what to expect in the upcoming days, we will have our first Get-Together on Monday morning.

A special keynote will introduce to the characteristics of networks, and the challenges in designing and maintaining networks.

Another highlight of the agenda is our field trip to the Zentrum am Berg (ZAB). With the ZAB at the Styrian Erzberg the Montanuniversität Leoben operates a unique and independent research infrastructure focused on the construction and operation of underground facilities.

Challenges of today's industries

Content:

Networks are essential for modern industry as they enable communication, collaboration, and the exchange of information and resources. The importance of networks has grown in recent years due to the globalisation of value chains and the widespread adoption of digital technologies, such as the internet, cloud computing, and the Internet of Things (IoT).

The use of networks can provide companies with greater flexibility and agility, and can furthermore lead to faster and more effective decision-making, as well as increased productivity and profitability. Supply chain networks enable businesses to coordinate the production and delivery of goods and services, while social networks can help to promote products and services and engage with customers.

With the advent of big data analytics, companies can use networks to collect and analyse vast amounts of data from various sources, such as customer feedback, social media, and IoT sensors. This can help them identify patterns and trends, gain insights into customer behavior, and improve their products and services.

Networks have become critical for modern industry, enabling businesses to connect, communicate, and collaborate in ways that were previously impossible.

What networks mean for modern industries and which challenges lie ahead will be discussed in presentations on Neural Networks (Elmar Rückert), Energy Networks (Thomas Kienberger), and Supply Chain Networks (Helmut Zsifkovits)

These presentations should serve as an input for the workshops on the following days.

Workshop days

Content:

The focus on these days is to understand the concepts and the use of the design approaches described below for proper design of any kind of networks. Through team exercises, group work and case studies as well as theoretical input you will develop the ideas of Engineering Design and learn how to use them in your future work.

Axiomatic design:

Axiomatic Design proposes a systematic approach for the design of products, processes, components, software etc. Axiomatic design applies a scientific approach for designing products according to customer needs. It is based on a process defining the following four levels:

- Customer Requirements (Customer Domain)
- Functional Requirements (Functional Domain)
- Design Parameter (Physical Domain)
- Process Variable (Process Domain)

Following the two Axioms (Independence and Information Axiom) participants will learn how to reduce complexity in large design projects like large systems or networks. Participants learn also how Model-Based Systems Engineering (MBSE) software can be used for using Axiomatic Design and Systems Engineering in general.

Course leader:



Dr.-Ing. Dipl.-Wirtsch.-Ing. Erwin Rauch

Professor for Smart and Sustainable Manufacturing

Head of Sustainable Manufacturing Lab und Head of Smart Mini Factory Lab

Free University of Bozen, Faculty of Engineering

After his studies at Free University of Bolzano and the Technical University of Munich he obtained his Ph.D. degree from the University of Stuttgart with summa cum laude. Currently he is an Endowed Professor for Smart and Sustainable Manufacturing at the Free University of Bolzano. He is the Head of the Smart Mini Factory laboratory for Industry 4.0 and the Sustainable Manufacturing Lab. Erwin Rauch is also author of over 200 scientific contributions and an expert/member of various associations and organisations (Associate Member EuroScience, Expert Group World Manufacturing Forum, EPIEM Steering Board). In his research he focuses on Sustainable Production, Industry 4.0/5.0, Smart Manufacturing, Human-Robot Collaboration in Assembly as well as Axiomatic Design (AD) and Design of Complex Systems.



Dr. Ali Bataleblu

Senior research associate
Sustainable Manufacturing Lab
Free University of Bozen, Faculty of Engineering

Ali is currently a post-doctoral research fellow at the Free University of Bozen-Bolzano. He received his M.Sc. and Ph.D. degrees in Aerospace Engineering from K.N. Toosi University of Technology (KNTU) in 2012 and 2018 respectively. He has more than ten years of work experience in the Space System Design Institute (SSDI) at the Department of Aerospace Engineering at KNTU and Industry since 2010. He has a broad sight in three separate fields of engineering, Aerospace Engineering, Mechanical Engineering, and Computer Science. His research specifically focused on systems engineering and MBSE, MDO, probabilistic design optimization, and machine learning areas such as surrogate-assisted design optimization, intelligent optimization, Monte-Carlo simulation, co-simulation, and co-design.

Design Thinking:

Design Thinking is both a methodology and an approach. It aims to release as much creative potential as possible among all stakeholders of an innovation project in order to systematically solve complex problems or tasks. Design thinking uses various methods to make the user's view with its wishes, needs and goals visible to the innovation team and therefore perfectly suitable to answer network-based questions.

It refers to the methodological aspect: creative thinking should be encouraged, promoted and used in a goal-oriented manner through methodical setting.

Course leader:



DI Hemma Bieser, MSc
Geschäftsführerin | Managing Partner
Innovation Company avantsmart

Hemma Bieser founded the innovation company avantsmart in 2011, with the aim of making innovation and sustainability profitable for businesses. Together with her clients, she develops new business models for the energy market of the future and thus co-shapes the energy transition.

She is an expert on new methods and tools in management: design thinking, business model innovation and lean startup strategies. As a consultant, moderator and speaker, she shares her know-how with entrepreneurs, innovation managers, product managers, service designers, researchers and students.

Hemma is lecturer for innovation, entrepreneurship and transformation at the University of Applied Sciences Technikum Vienna and University of Applied Arts, and Authorized IC Agile Instructor. Since 2022 she is member of the management board of Austria's first energy-cooperative OurPower.

Organisational matters

Application:

Applicants must submit a motivation letter, answering the following questions:

- Why would you like to participate in the TU Austria Summer School Doc+?
- How do you see the importance of networks for your future work?
- What experience do you have in the field of networks?

All application documents should be submitted in English and must be received no later than 21 July 2023. Please send the documents to the contact person at your university.

- Please note that the number of participants is limited (16 participants).

Costs:

The respective university will carry the costs for TU Austria Summer School Doc+ as well as accommodation, arrival, and departure (public transport only). For details please speak to the contact person at your university.

Contact persons:



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Speakers



Prof. János Kertész - requested

Complexity Hub

János Kertész obtained his PhD in Physics 1980 from Eötvös University. He worked at the Research Institute of Technical Physics of the Hungarian Academy of sciences, at the Cologne University and at Technical University Munich. He has been professor at the Budapest University of Technology and Economics (1992-2018), and since 2012 at CEU, since 2018 as Head of Department of Network and Data Science. He was visiting scientist in Germany, US, France, Italy and Finland. He is interested in statistical physics and its applications, including percolation theory, phase transitions, fractal growth, granular materials and simulation methods. During the last 25 years his research has focused on multidisciplinary topics, mainly on complex networks as well as on financial analysis and modeling. He has published more than 280 scientific papers. He has been on the editorial boards of Journal of Physics A, Physica A, Fluctuation and Noise Letters, Fractals, New Journal of Physics, Physical Review E, Computational Sociat Science and J. Phys. Complexity. His work has been awarded by several recognitions, including the Hungarian Academy Award, the Szent-Györgyi Award of the Ministry of Education and Culture, the Széchenyi Prize, the title of Finland Distinguished Professor and the Korean Benjamin Lee Professorship.



Univ. Prof. Dr. Thomas Kienberger

Professor at Montanuniversität Leoben (Austria)

Prof. Kienberger is head of the Chair of Energy Network Technology at the University of Leoben. He holds a Master-degree in Electrical-Engineering and PhD-degree in Energy-Engineering, both from the Technical University of Graz.

After his PhD-studies in 2010, he joined the VC-funded start-up agnion-ENTRADE working as head of R&D and authorized representative. Based on this background in the renewable-energy industry, he started in 2014 as a Professor for Energy Network Technology at the University of Leoben.

His research focusses on the demand-actuated implementation of renewable energy in future energy-grids and on efficient industrial energy-systems. Besides his industrial activities, Prof. Kienberger has raised several M€ in competitive research funding and published more than 100 journal- and conference-papers.



Univ.-Prof. Dr. Elmar Rückert

Professor at Montanuniversität Leoben (Austria)

Prof. Dr. Elmar Rueckert is the chair of the Cyber-Physical-Systems Institute at the Montanuniversitaet Leoben in Austria. He supervises currently six Ph.D. students, is involved in national and international projects, and teaches basic and advanced machine & deep learning and robotics courses. His research interests include stochastic machine and deep

learning, robotics and reinforcement learning, and fundamentals of human learning & motor control.

In 2014, he passed his Ph.D. defense in computer science at the Graz University of Technology with distinction. Thereafter, he was for four years active as a senior researcher and research group leader at the Technical University of Darmstadt. In 2018, he joined for three years the University of Luebeck as an assistant professor and lecturer of machine and reinforcement learning courses. In 2019, he won the 'German Young Researcher Award' endowed with EUR 15,000, which is among the most important AI award for young scientists in Germany, Austria, and Swiss.



Univ. Prof. Dr. Helmut Zsifkovits

Professor at Montanuniversität Leoben (Austria)
Chair, European Certification Board for Logistics (ECBL)
Executive Board Member, BVL – Austrian Logistics Association

Helmut Zsifkovits took over the IL chair in October 2008. He graduated in business administration at the Karl-Franzens-University Graz, was university assistant at the University of Graz, Head of Logistics/Industry at the Austrian Academy for Executives, Managing Partner of Systemlogistik GmbH, Project Manager at the evolaris eBusiness Competence Center in Graz, Head of the Administration Academy of the City of Graz as well as team leader for intranet projects of UBG/DaimlerChrysler AG.

Helmut Zsifkovits teaches at various universities and colleges. His work focuses on logistics, process management and complexity management. He has published numerous publications on logistics concepts and other topics.



Thomas Bürgler

K1-MET, voestalpine

Thomas Bürgler leads Research and Development Iron and Steelmaking at voestalpine and is the Chief Executive Officer (CEO) of K1-MET GmbH. He studied metallurgy (smelting) at the University of Leoben and has expertise as a project and research manager not only in his studied field but also in the processes for iron and steel production. He is jointly responsible for environmental and energy aspects as well as for process development in the field of metallurgy. He is also involved at international level in collaborations on research and investment projects. He trained as a mechanical engineer and also teaches as a lecturer in process engineering at the Montanuniversitaet Leoben and materials science at the HTL in Linz.



Dipl.-Ing. Franz Schwammenhöfer

Logistikbeauftragter BMK

Franz Schwammenhöfer heads the Logistik coordination office at the Austrian Federal Ministry for Climate Action (BMK) since 2015. His task is to look beyond transport policy and, in close cooperation with the industry, to develop strategies to improve competitiveness and location quality in the area of freight transport and logistics while taking sustainability aspects into account.



DI Peter Umundum

Member of the Board, Post AG

Peter Umundum, born in 1964, earned a degree in computer science from the University of Graz and started his professional career in 1988 when he joined Steirerbrau AG, where he headed the organisation and information as well as the IT department. He left the company in 1994 to join Styria Medien AG as its IT director, where he pioneered online services and became the managing director of its subsidiary Media Consult Austria GmbH after only two years.

In 1999, he co-founded redmail and became its managing director. He oversaw Styria Gruppe's first steps in the Croatian market. In 2001, Peter Umundum was entrusted with the position of managing director of the newspaper "Die Presse". Three years later, he was appointed managing director of the daily "Kleine Zeitung". During that time, he also served on the boards of Austria Presse Agentur (APA), Verband Österreichischer Zeitungen (VÖZ) and Österreichische Auflagenkontrolle (ÖAK).