

Dozierende	Bachelor-Plätze	Master-Plätze	Englisch	Beschreibung	Voraussetzungen	Literatur	Geeignet für Lehramtsstudierende
Claudia Czado	0	8	✓	<p>In this seminar we will investigate modern regression methods, such as regularization, boosting, nonparametric and tree based approaches for regression data. The goal is to understand the theory and to apply the methods to real data sets. The students are encouraged to propose data sets, which will then be used for all topics. We will follow the book by Fahrmeir et. al (2022) and references within.</p> <p>For your application to this seminar please provide CV with grade information.</p> <p>Seminar Topics:</p> <ol style="list-style-type: none"> <li>1. Regularized regression (Section 4.2)</li> <li>2. Boosting linear regression models (Section 4.3)</li> <li>3. Nonparametric regression using univariate smoothing (Section 8.1)</li> <li>4. Nonparametric regression allowing for bivariate and spatial (Section 8.2)</li> <li>5. Structured additive regression (Sections 9.1, 9.2, 9.3, 9.5, 9.6)</li> <li>6. Quantile regression (Section 10.1)</li> <li>7. Tree based regression (Section 2.11.1 + references within)</li> <li>8. Neural networks and deep learning (Section 2.11.2 + references within)</li> </ol>	Generalized Linear Models (MA3403) Computational Statistics (MA4402)	<p>Book: Fahrmeir, Kneib, Lang and Marx (2022): Regression: Models, Methods and Applications (Second edition) Springer (available online over TUM library)</p> <p>Web page for book: <a href="https://www.uni-goettingen.de/de/550514.html">https://www.uni-goettingen.de/de/550514.html</a></p> <p>Data sets of book: <a href="https://www.uni-goettingen.de/de/551625.html">https://www.uni-goettingen.de/de/551625.html</a></p> <p>Software code for examples: <a href="https://www.uni-goettingen.de/de/551585.html">https://www.uni-goettingen.de/de/551585.html</a></p> <p>Software resources from Thomas Kneib: <a href="https://www.uni-goettingen.de/de/software/497505.html">https://www.uni-goettingen.de/de/software/497505.html</a></p>	✓
Michael Ulbrich	5	7	✓	<p>The seminar presents recent advances in nonlinear optimization and related fields. It also serves as a preparation for a Bachelor's or Master's thesis in this area. The talks cover innovative developments in the following fields: Optimization theory; efficient numerical solvers and their convergence theory; optimization of complex systems; stochastic and robust optimization; optimal control; novel applications in data science and machine learning, technology, engineering, natural sciences, AI, etc.</p>		<p>Preliminaries:</p> <p>For Bachelor students: Einführung in die Optimierung (MA2012); recommended, but not mandatory, is also Nonlinear Optimization (MA3503).</p> <p>For Master students: Einführung in die Optimierung (MA2012) or Nichtlineare Optimierung: Grundlagen (MA2503); Nonlinear Optimization (MA3503).</p> <p>The talks are typically based on recent journal publications.</p> <p>The topics for the talks will be presented and can be chosen in the first week of the summer semester 2023.</p>	✓
Caroline Lasser	6	6	X	<p>Das Seminar ist ein Lektüre und Diskussionskurs von Teil II des Buches "Mathematics for Machine Learning" von M. Deisenroth, A. Faisal, C. S. Ong (Cambridge University Press, 2020).</p>	linearer Algebra und Numerik. Analysis	M. Deisenroth, A. Faisal, C. S. Ong: Mathematics for Machine Learning, Cambridge University Press, 2020	✓
Noam Berger Steiger	3	5	✓	<p>We discuss various random graph models. We start with the classical Erdos-Renyi graph and continue with other models that intend to model real-world networks. We will discuss the configuration model, the preferential attachment model and possibly also scale free percolation.</p>	Probability theory	<p>RANDOM GRAPHS AND COMPLEX NETWORKS Remco van der Hofstad</p> <p>available online at <a href="https://www.win.tue.nl/~rhhofstad/NotesRGCNII.pdf">https://www.win.tue.nl/~rhhofstad/NotesRGCNII.pdf</a></p>	✓

Johannes Müller, Volker Gerd Jürgen Hösel	6	6	✓	<p>In the morning, some of us get up easily, while others need some effort to make it to the first lecture in time: Some persons are "larches", and some "owls". Which chronotype do you belong to?</p> <p>Among other things, the mechanisms behind chronotypes are investigated by chronobiology. Basically, the human physiology incorporates several oscillators, e.g. that responsible to control food uptake, sleep, or core body temperature. These systems can be described by forced oscillators. In this seminar we will explore some of the theories for forced and coupled oscillators and their application in chronobiology.</p>	Analysis und lineare Algebra	Lit.: To be announced specifically for the talks. Iooss, Elementary stability and bifurcation theory, Springer, 1990.	✓
Barbara Wohlmuth	13	0	X	<p>Fraktale Strukturen spielen eine wichtige Rolle in der Natur und eröffnen spannende mathematische Fragestellungen. So weisen Verästelungen von Pflanzen, die Geographie von Küsten-Linien, oder das Wachstum von Kristallen selbstähnliche Strukturen auf. Schlüssel für die Erzeugung solcher Strukturen sind oftmals rekursive Algorithmen oder spezielle dynamischen Systeme. Bekannten Bilder wie die Mandelbrot-Menge, das Sierpinski-Dreieck, die Drachenkurve oder der Lorenz-Attraktor können so erzeugt werden. Die Spannweite der Themen deckt sowohl theoretische Fragestellungen wie auch algorithmisch orientierte Aufgaben mit Anwendungsbezug ab. Spezialliteratur wird während der Vorbesprechung bekanntgegeben.</p> <p>Information: Die erste Vorbesprechung wird voraussichtlich am 10.02.2023 (oder nach individueller Vereinbarung) stattfinden.</p>	<p>Analysis 1&amp;2 Lineare Algebra und Diskrete Strukturen 1&amp;2 Programmierkenntnisse (z.B. Einführung in die Programmierung MA0010) Numerik (MA0008)</p>	<p>K. Bräuer - Chaos, Attraktoren und Fraktale. Mathematische und physikalische Grundlagen nichtlinearer Phänomene mit Anwendungen in Physik, Biologie und Medizin Kenneth Falconer - Fractal geometry Peitgen Heinz-Otto - Chaos and fractals</p>	✓
Christina Kuttler	5	7	✓	<p>Delay equations are an interesting topic, concerning theoretical aspects as well as their application for modelling purposes. Dependent on the previous knowledge and interest of the participants we will get to know some theoretical aspects (especially in comparison to equations without delay) and see many examples of applications, especially in Biology and Medicine.</p>	Knowledge in Ordinary differential equations	Hal Smith: An Introduction to Delay Differential Equations with Applications to the Life Sciences, and original papers	✓
Oliver Junge	12	0	✓	<p>This seminar is a collection of interesting application problems which illustrate solution techniques in scientific computing. The technique for each problem is discussed and demonstrated through some appropriate code in the Julia programming language.</p>	Solide Kenntnisse in Analysis, linearer Algebra und Numerik.	Walter Gander, Jiri Hrebicek: Solving Problems in Scientific Computing using Maple and Matlab, Springer, 2004.	✓