

Vorlesungsverzeichnis

M.Sc. Digital Engineering

SoSe 2023

Stand 23.03.2023

M.Sc. Digital Engineering

Seit Wintersemester 2018/19 besteht an der Bauhaus-Universität Weimar ein zusätzliches Angebot an fächerübergreifenden Lehrveranstaltungen im Rahmen der Bauhaus.Module. Ob diese Module des **Wahlbereichs** ersetzen können, muss individuell mit der Fachstudienberatung geklärt werden. Das Angebot der Bauhaus.Module findet sich unter www.uni-weimar.de/bauhausmodule.

301016 Complex dynamics

B. Rüffer

Veranst. SWS: 4

Vorlesung

Di, wöch., 07:30 - 10:45, Coudraystraße 13 A - Hörsaal 2

Beschreibung

After the course the students will be able to analyse mathematical models that describe dynamic behaviour, as they occur in engineering (e.g. mechanical coupling of building structures), in biology and in physics, but also in multi-agent systems in computer science, or as opinion dynamics in psychology. Based on examples from different disciplines, students learn to build simplified models that allow to answer questions on their long-term behaviour. Students will be able to apply methods of feedback design that help shape the dynamics of a given system, along with the relevant stability concepts. As several topics lend themselves for computer simulation, students of this course will develop a proficiency to both implement and analyse mathematical models using computational tools and software.

Bemerkung

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

Voraussetzungen

B.Sc., knowledge in Matlab or Python

Leistungsnachweis

1 written exam

"Complex dynamics"

120 min (100%) / **SuSe** + WiSe

301017 Mathematics for data science

B. Rüffer, M. Schönlein

Veranst. SWS: 4

Vorlesung

Mo, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

After the course the students will be familiar with the fundamental concepts of data science. The participants can analyse given data sets with respect to dimensionality reduction and clustering. They also know the basic structure of neural networks and support vector machines to solve classification tasks. The participants know relevant methods

from linear algebra and optimization and can apply these techniques. This embraces the design of appropriate algorithms and the implementation of different numerical methods to solve the corresponding problems.

Bemerkung

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

Voraussetzungen

B. Sc.; Analysis and Linear Algebra at Bachelor level, knowledge of Matlab or Python

Leistungsnachweis

1 written exam

"Complex dynamics"

120 min (100%) / **SuSe** + WiSe

401009 Experimental structural dynamics and Structural monitoring (P)

V. Zabel

Veranst. SWS: 4

Projekt

Di, wöch., 07:30 - 12:30, Marienstraße 7 B - Projektraum 301

Beschreibung

The students obtain deepened knowledge in structural dynamics, structural dynamic analysis, data processing, dynamic test equipment and its handling. They learn to analyse the dynamic behaviour of a structure utilizing both numerical and experimental state-of-the-art methods. Furthermore, the students have to develop strategies and concepts of investigation. The work in small groups enhances the social competence of the students.

Operational modal analysis, sensor types, sensor positioning, data analysis and assessment, assessment of structural changes, structural modelling, model updating

Bemerkung

14 students from NHRE only

Voraussetzungen

Structural dynamics

Leistungsnachweis

1 Project report + intermediate and final presentations

„ Experimental structural dynamics“

(100%) / **SuSe**

439100/ 904003 Prüfung: Spatial information systems/ Raumbezogene Informationssysteme (GIS)

T. Gebhardt, V. Rodehorst

Prüfung

Di, Einzel, 13:00 - 15:00, 25.07.2023 - 25.07.2023