

t.NTS1 - Natur, Technik und Systeme 1

Person responsible for the course: Hans Ulrich Fuchs, fusa

Credits: 9

Valid for: 2011/2012

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Learning objectives:

Description, experimental investigation, analysis and modeling of natural and technical dynamical systems. Students develop an understanding of systems science and scientific methods.

Strengthening knowledge of physical and chemical processes. Building up of process thinking and analogical reasoning (transfer of models to new applications and fields). Students learn to apply important computer based tools for data acquisition, data analysis and dynamical modeling.

Development of techniques for project planning and execution of projects, as well as of scientific writing and presentation.

Course content:

Physics of dynamical fluid, electrical, and chemical systems. Structure of dynamical models (laws of balance, constitutive relations, energy principle, parameters).

Handling of time series. Modeling and simulation of dynamical systems.

Programming in Matlab.

Semester project; written report and/or oral (poster) presentation.

Previous knowledge:

Physics and mathematics of the technical professional baccalaureate (or equivalent).

Teaching method:

Type of lesson:	Number of lessons per week:
Lecture	14x2L
Tutorial/Practicum	
Group teaching	14x(4L + 2L)
Block instruction	
Seminar	

Assessment:

According to the table or as specified in writing by the lecture at the beginning of the semester!

Number	Type	Weighting
1	End of term exam	60%
1	Exam during the semester	10%
10	Further assessments	30%

Language of instruction:

English or German

Instruction material:

Lecture notes, eLearning-modules with data of experiments and models, slides, old exams.

Fuchs, Borer, Frommenwiler, Knoll, Kopacsy, Maurer, Schütz, Studer: Physik - eine systemdynamischer Zugang für die Sekundarstufe II, hep-verlag, 2010.

Fuchs: Modeling of Uniform Dynamical Systems, 2002.

Fuchs: The Dynamics of Heat. Springer, New York, 2010.

Comments:

Course details are fixed and communicated at the beginning of the semester.