Modeling, Simulation, and Optimization

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Sommersemester

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Vorlesungszyklus Volker Kaibel:

	Wann	Titel	SWS	Zielgruppe
K0	WS	Einführung in die Optimierung	4+2	B3
K1	WS	Kombinatorische Optimierung	4+2	B5, M1
K2	SS	Ganzzahlige Optimierung	3+1	B4,B6,M2
K3	WS	Geometrische Methoden der D.O.	4+2	M1
K4	SS	Algebraische Methoden der D.O.	3+1	M2

Vorlesungszyklus Sebastian Sager:

	Wann	Titel	SWS	Zielgruppe
S0	WS	Einführung in die Optimierung	4+2	B3
S1	WS	Nichtlineare Optimierung	4+2	B5, M1
S2	SS	G.-g. nichtlineare Optimierung	3+1	B4,B6,M2
S3	WS	Opt. Methods for Machine Learning	4+2	M1
S4	SS	Modeling, Simulation, Optimization	3+1	M2

Example: focussing on optimization

Wann	Titel	Dozent
B3	S0 Einführung in die Optimierung	Sager
B5	S1 Nichtlineare Optimierung	Sager
B6	S2 G.-g. nichtlineare Optimierung	Sager
B6	Bachelorarbeit	IMO
M1	S3 Opt. Methods for Machine Learning	Sager
M1	K1 Kombinatorische Optimierung	Kaibel
M2	S4 Modeling, Simulation, Optimization	Sager
M2	K2 Ganzzahlige Optimierung	Kaibel
M3	Masterarbeit	IMO

- Alternative lectures
- *S3 Mathematics for Clinical Decision Support*
- *K3 Discrete Aspects of Machine Learning*

Lecture setup

- Lecture in different curriculae with modular content

Curriculum	Presence	Self study	Credits
(BMI) Mathematikingenieur (Bachelor)	4SWS, 56h	184h	8 CPs
(MM) Mathematik (Master)	4SWS, 56h	124h	6 CPs
(CoME) Comp. Methods for Engineering (Master)	4SWS, 56h	94h	5 CPs

- Also accepted by MathCoRe and IMPRS

- Requirements (BMI) and (CoME): analysis, linear algebra, programming

- Requirements (MM): Introduction to Optimization, Nonlinear Optimization

- Lecture will be in English

- Particular setting: $\approx$ 100 (CoME) students $\approx$ 5 Math students!

- Work load distributed over the semester – some weeks more, some less

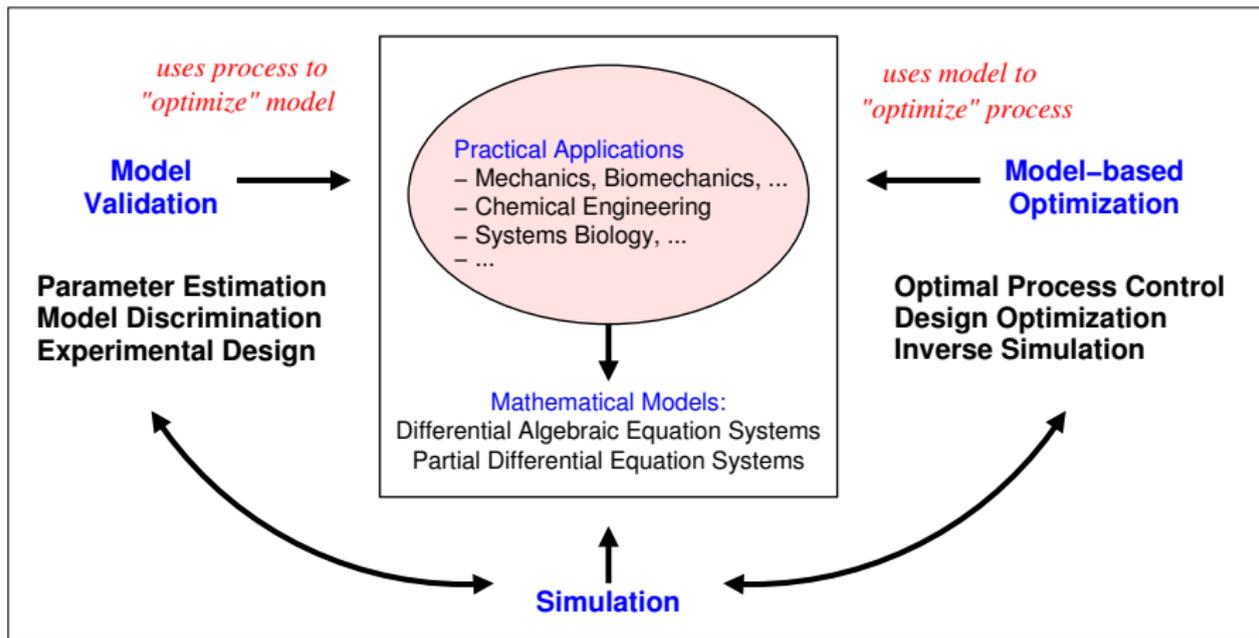# Table of Contents

Optimization with Differential Equations

Mathematical models may also be (partly) machine learning models!

Hints

Ideally, you have

- Einführung in die Optimierung
- Nichtlineare Optimierung
- Proficiency in programming (julia, python, ...)

Target group

- Master students mathematics
- PhD students
- Other disciplines welcome, but warning: mathematical point of view!

Comments

- Master thesis possible
- Regular optimization seminars
- Online material (videos) available
- More info: https://mathopt.de/teaching