Simulation and Modeling I

Winter Term 2025/2026

Contents and Organization

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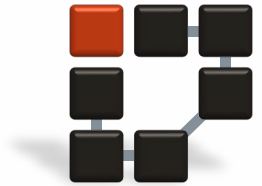

Audience, Language, Lecturers

- Audience
  - computational engineering
  - computer science
  - mechanical engineering
  - data science
  - ...
  - bachelor/master
- Language
  - lectures and exercise classes are given in English (individual conversation in German always possible)
  - all material is in English
- Lecturer
  - Prof. Reinhard German
  - exercise classes:
    - supervisors:
      - M.Sc. Jonathan Fellerer
      - Dr.-Ing. Anna Baron
    - tutor:
      - tbd

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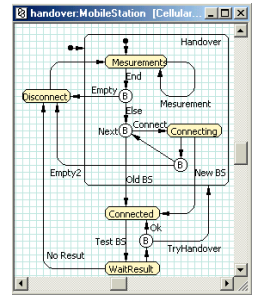
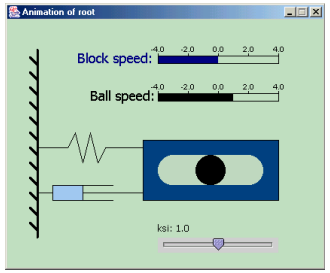
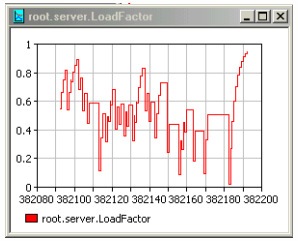
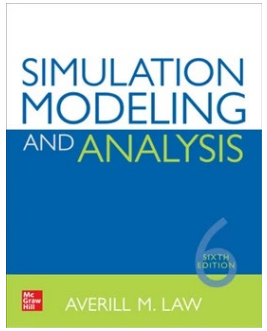






- Lectures
  - Introduction to Simulation
  - Discrete Simulation
  - Analytical Modeling
  - Modeling Paradigms (e.g., event/process oriented, queueing systems, Petri nets, UML statecharts)
  - Input Modeling (e.g., Distribution Fitting)
  - Random Number Generation
  - Output Analysis
  - Continuous and Hybrid Simulation
  - Simulation and AI **New**
- Exercises
  - Refresher on Probability Theory (as needed for Simulation)
  - Practical experience with modelling and various simulation tools
- Sources
  - Averill Law: "Simulation Modeling and Analysis", 6th ed., McGraw Hill, 2024
  - AnyLogic in Three Days
    https://www.anylogic.com/resources/books/free-simulation-book-and-modeling-tutorials/
  - Additional material can be found on StudOn



Organization

- Lectures
  - classroom lectures with main material and Q&A: Monday, 14:15 – 15:45 (H4)
  - StudOn: slides
  - complemented by lecture videos, mainly for repetition, need to watch sometimes, as will be announced

- Examinations
  - written (90 minutes) examination after semester
  - and on demand written certifications with or without grade

Questions? -> Q&A

Organization (cont.)

- Exercise classes
  - **Theory Sessions (in 0.157-115 CIP):**
    On **Thursday**, 12:15-13:45. We'll introduce exam relevant content on some topics!
    Only on: 16.10, 06.11, 27.11, 11.12, 15.01
  - **Support Sessions (in 0.157-115 CIP, only if no Theory Session is in the same timeslot):**
    On **Thursday**, 12:15-13:45 **and** 14:15-15:45, supervised working is offered to help you with the assignments ☺ every week – starting 23.10.
  - **Submission Sessions:**
    On **Monday**, 10:15-11:45 **or** 12:15-13:45: Attendance is required to collect assignment points.
    Register via StudOn (equal chances, registration period: 13.10. 12:00 to 19.10. 18:00)
    Only at days where submission is due (see slide 9, first on 27.10.)
- 50% of exercise must be passed to complete the 5 ETCS module!
  - Theory exercises will introduce exam relevant content on some topics
  - If 70% of exercise has been passed your grade in the exam will be improved by one step
  - If 90% have been reached, the grade improves by two steps
  - Bonus only applies to passed exams!

A hopeful request …

… Please do not use laptops or other smart devices during my lecture – thank you!

Combination with other lectures at Informatik 7

- Simulation and Modeling II in summer semester
  - Project-oriented: teams of three/four
    - project management, presentation, documentation, case studies
    - advanced topics: parallel and distributed simulation, variance reduction techniques, rare event simulation, AI and simulation
  - Simulation projects
    - former projects: traffic intersection, gas station, bus line, street/garden cafe, university cafeteria, supermarket, drinks terminal, Ferris wheel at Bergkirchweih, ambulance station, smartphone energy management, energy costs for houses with photovoltaics and battery, energy demand of plug-in-hybrid vehicles, industrial Ethernet, transportation mode choices, vehicular communication
      …
    - own project ideas are possible

Combination with other lectures at Informatik 7