# SEN9110 Simulation Masterclass
## 14. Exam

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Brightspace: SEN9110

# Exam

- 4 questions, only make 3
  - If you make all 4, I will ignore the answer to the last question
- Always a question about DEVS
  - Different from earlier years: no question to make a DEVS model yourself, but possibly interpreting a given model
- It's about insight and motivation of the answer
  - not about 'right' or 'wrong'
  - comparisons; show why and why not
  - comparisons; use tables or figures
- All materials available on the computer; USB is allowed (PDF only)

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 1. Introduction**

- R.E. Nance. The time and state relationships in simulation modeling.

**Lecture 2. System Theory**

- Russell L. Ackoff and Jamshid Gharajedaghi. On the Mismatch between Systems and their Models.

**Lecture 3. System Specification**

- T.J. Schriber, D.T. Brunner, & J.S. Smith. Inside Discrete-Event Simulation Software: how it works and why it matters.

  ***Especially the lists, and the states a simulation entity can be in.***

  ***Not the implementations in different simulation languages.***

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 4. DEVS**

- Chapter 1 from Zeigler, B.P., H. Praehofer and T.G. Kim (2000). Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems, 2nd Ed.
- Yentl Van Tendeloo, Hans Vangheluwe. Introduction to Parallel DEVS Modelling and Simulation. ***Not the detailed examples in set theory.***

**Lecture 5. DEVS Extensions**

- B.P. Zeigler. DEVS Today: Recent Advances in Discrete Event-Based Information Technology
- B.P. Zeigler. Embedding DEV&DESS in DEVS.

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 6. Object-oriented Simulation**

- P.H.M. Jacobs, N.A. Lang, A. Verbraeck. DSOL: A Distributed Java based discrete event simulation architecture. ***Only OO aspects, not the DSOL package***
- J.A. Joines and S.D. Roberts. Simulation in an Object-Oriented World.
  ***Not the detailed implementation***

**Lecture 7. Parallel and Distributed Simulation**

- Richard Fujimoto. 2015. Parallel and distributed simulation.
- Kalyan S. Perumalla. 2006. Parallel and distributed simulation: traditional techniques and recent advances. ***Not the details about implementation***

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 8. Distributed Simulation using HLA**

- Christopher D. Carothers, Richard M. Fujimoto, Richard M. Weatherly, and Annette L. Wilson. 1997. Design and implementation of HLA time management in the RTI version. ***Not all the details about HLA***
- Judith S. Dahmann, Richard M. Fujimoto, and Richard M. Weatherly. 1997. The Department of Defense High Level Architecture. ***High-level only (general working, groups of services), not all the HLA details***

**Lecture 9. Interactive and Real-time Simulation**

- Young Kwan Cho, Xiaolin Hu and Bernard P. Zeigler. The RTDEVS/CORBA Environment for Simulation-Based Design of Distributed Real-Time Systems. ***Not covered. Slides about Real-time simulation only***
- Peter H.M. Jacobs, Alexander Verbraeck, and William Rengelink. Emulation with DSOL. ***No details; notion of emulation and hardware-in-the-loop only***

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 10. Simulation and Gaming**

- Alexander Verbraeck, Stijn-Pieter A. van Houten. From Simulation to Gaming: An Object-Oriented Supply Chain Training Library. ***Notion of human-in-the-loop only; in class we covered dead reckoning***
- Rick van Krevelen, Martijn Warnier, Frances Brazier, Alexander Verbraeck and Thomas Corsi. Transparency, Consistency and Modularity of Strategic Reasoning: An Agent Architecture for Interactive Business Simulations. ***Not covered, but general notion of human agents and computerized agent in DES/ABM***

**Lecture 11. Multi-Paradigm Simulation**

- H. Vangheluwe, J. de de Lara, P.J. Mosterman. An introduction to multi-paradigm modelling and simulation.
- H. Vangheluwe, H. and J. de de Lara. "Meta-models are models too"

# Covered papers reader 2024-2025

Complete - Partly - Not Covered

**Lecture 12. Multi-Resolution Simulation**

- Y. Yilmaz, A. Lim, S. Bowen, & T. Ören. Requirements and Design Principles for Multisimulation With Multiresolution, Multistage Multimodels.
- Mamadou D. Seck, H. Job Honig. Multi-perspective modelling of complex phenomena. ***Not covered***

**Lecture 13. Simulation Languages 1**

- Richard E. Nance. Simulation Programming Languages: An Abridged History.
- Ole-Johan Dahl and Kristen Nygaard. SIMULA - An ALGOL-based Simulation Language. ***No details about the language***

**Lecture 14. Simulation Languages 2**

- T.W. Tewoldeberhan, A. Verbraeck and V. Hlupic. Implementing a discrete-event simulation software selection methodology for supporting decision making at Accenture. ***Not covered***

# Exam - final remarks

- All slides, lectures, materials on the white/blackboard are exam materials
- Shorter answers are better than longer ones
- Structured answers are better than a brain dump
- Write in pen only (!)

- **Register for the exam (!)**
- **If you bring a USB stick, do format it in 'Windows' mode on a Mac. Otherwise it will be unreadable.**