

Course Syllabus: AT.504.EN Discrete Event Systems

Instructor: Yuri Shardt (e-mail: yuri.shardt@tu-ilmenau; Website: <http://www.tu-ilmenau.de/en/at>)

Office: Zusebau 3006

Office Hours: I follow the open-door policy. When I am in my office, I will happily answer your questions. If you wish a fixed appointment, please e-mail me to arrange it. I am not available Thursdays and Tuesdays afternoon.

E-Mail Policy: I will respond to all e-mails within 1 workday after arrival. A day runs from 9:00 pm to 9:00 pm the next day. Weekends are excluded from the computation. In the subject header of your e-mails, please place the phrase “[AT.504]” so that I can respond faster to your e-mails.

Course Website: <https://www.tu-ilmenau.de/at/lehre/at504-ereignisdiskrete-systeme>

Lecture: Mondays: 1:00 to 2:30 pm in H 1519

Wednesdays: 3:00 to 4:30 pm H 1519

NB: The lectures on April 10th, May 1st and 29th, June 7th and 12th, and July 10th and 14th, 2023 are all cancelled.

Course Overview

This course examines the modelling and control of discrete event systems using automata. Both theoretical and practical results are provided that allow for different cases to be solved. The main topics are:

- 1) **Introduction to Discrete Event Systems (2 Weeks; Chapter 1)**
- 2) **Languages and Automata (5 Weeks; Chapter 2)**
 - a. **Concepts of Languages and Automata**
 - b. **Operations on Automata**
 - c. **Finite-State Automata**
 - d. **Analysis of Discrete Event Systems**
- 3) **Supervisory Control (5 Weeks; Chapter 3)**
 - a. **Feedback control with Supervisors**
 - b. **Specifications on Controlled System**
 - c. **Control with Partial Controllability**

- d. **Nonblocking Control**
- e. **Control under Partial Observation**
- f. **Decentralised Control**

Prerequisites

I expect that you have knowledge in the following areas:

- 1) **Automata:** The basics of what automata are and how they are used.
- 2) **Math:** The basics in calculus.

Grading

Final

100%

You will be able to use your own copy of the course notes, the recommend textbook, and a dictionary as references on the final exam. All other material will not be permitted. A simple calculator without any communication capabilities, *e.g.* WiFi or BluTooth, will also be permitted.

Recommended Textbook

The course is based on the following book:

- Christos G. Cassandras and Stéphane Lafortune (2008), *Introduction to Discrete Event Systems*, 2nd edition, Springer: New York, New York, United States of America.