UNIVERSITÀ DEGLI STUDI DI BERGAMO
Dipartimento di Ingegneria Gestionale, dell'Informazione e della Produzione

Advanced methods for system identification Ph.D. course

Lesson 0: Course logistics

Ph.D. IN ENGINEERING AND APPLIED SCIENCES

TEACHER
Mirko Mazzoleni

PLACE
University of Bergamo

Who I am

- **Name:** Mirko Mazzoleni

- **Studies:** Ph.D. Engineering and Applied Sciences at *University of Bergamo* (Control specialization) + Master degree Computer Engineering (CE) at *University of Bergamo*

- **Currently:** Assistant Professor @ *University of Bergamo*

  ✓ System identification and fault diagnosis
  ✓ System identification and data analysis (Master Degree Computer Engineering)
  ✓ Data science and automation (Master Degree Mechanical Engineering)

- **Contact details:**

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  ✓ https://mirkomazzoleni.github.io/
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  ✓ https://www.facebook.com/ControlAutomationLabUnibg/

Course organization

Timetable

- Monday 28 June 9:00 – 13:00
- Wednesday 30 June 9:00 – 13:00
- Firday 2 July 9:00 – 13:00
- Monday 5 July 9:00 – 13:00
- Wednesday 7 July 9:00 – 13:00

Modality

- Virtual meeting with Google Meet
- 45 minutes lessons + 15 minutes breaks

Teaching material

Provided

- Course slides and code

Textbooks

- T. Söderström, P. Stoica, *"System Identification"*, Prentice Hall, 1989
- L. Ljung, *"System Identification: Theory for the User"*, Prentice Hall, 1987
- R. Pintelon, J. Schoukens, *"System Identification: A Frequency Domain Approach",* Wiley, 2012.
- T. Söderström, *"Errors-in-Variables Methods in System Identification",* Springer, 2018.

Scientific articles

- G. Pillonetto et. al., "Kernel methods in system identification, machine learning and function estimation: A survey", Automatica, Volume 50, Issue 3, 2014.

- J. Schoukens, M. Vaes and R. Pintelon, "Linear System Identification in a Nonlinear Setting: Nonparametric Analysis of the Nonlinear Distortions and Their Impact on the Best Linear Approximation," in *IEEE Control Systems Magazine*, vol. 36, no. 3, pp. 38-69, June 2016, doi: 10.1109/MCS.2016.2535918.

Course content

1. Multivariable system identification
2. Adaptive and recursive methods
3. Instrumental variables
4. Frequency domain system identification
5. Kernel methods for system identification