ENERGY DATA SCIENCE

Introduction to the course: Part 1

Prof. Juri Belikov

Department of Software Science
Tallinn University of Technology
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LET'S GET ACQUAINTED

My main research interests lie on the edge of nonlinear control theory, power systems, and computer science - energy informatics.

✓ Team of applied mathematicians, specialised on fundamental studies of control systems

✓ Selected application areas are in energy domain, buildings, and robotics

https://www.linkedin.com/company/nonlinear-control-systems-group

https://taltech.ee/en/department-of-software-science/research-groups#p40025

https://cc.ioc.ee/dokuwiki/doku.php?id=en:start

LET'S GET ACQUAINTED (2)

TALLINN UNIVERSITY
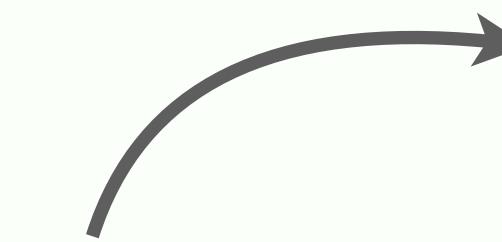
2003 – 2006 **BSc** (*cum laude*)
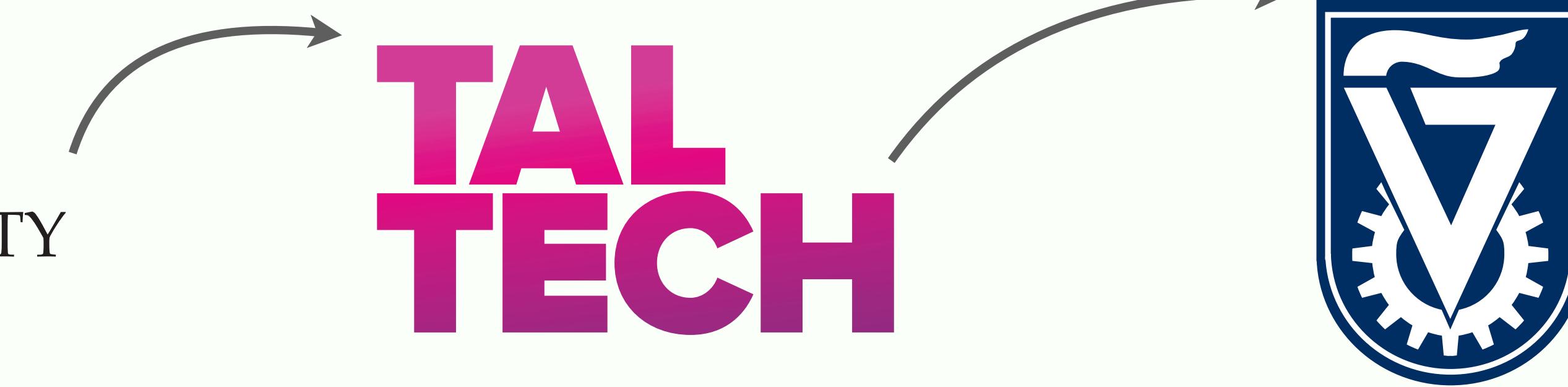
Department of Mathematics,

Tallinn University

LET'S GET ACQUAINTED (2)

TALLINN UNIVERSITY

TAL TECH

2003 – 2006 **BSc** (*cum laude*)

Department of Mathematics,

Tallinn University

2008 – 2012 **PhD**

2006 – 2008 **MSc**

Department of Computer Control,

Tallinn University of Technology

LET'S GET ACQUAINTED (2)

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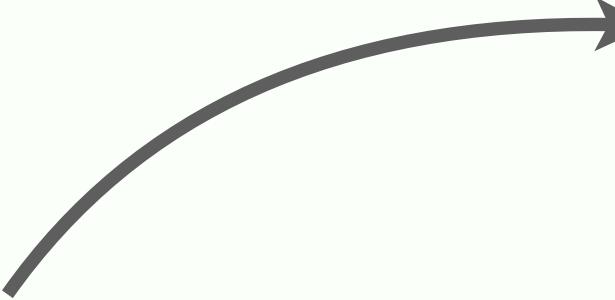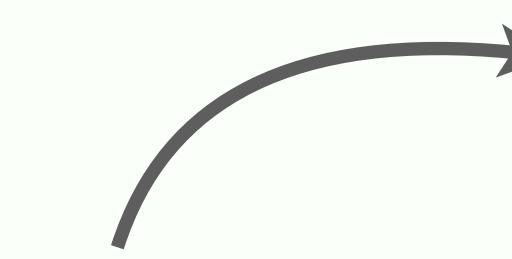
2015 – 2017 **postdoc**
The Viterbi Faculty of Electrical Engineering,
Technion, Israel

LET'S GET ACQUAINTED (2)

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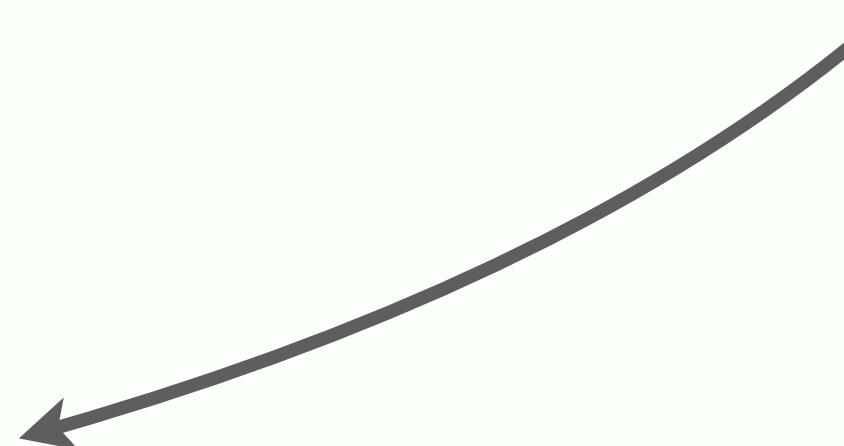
2023 – … **Tenured Associate**
Professor
Head of Nonlinear Control Systems
Research Group

2015 – 2017 **postdoc**
The Viterbi Faculty of Electrical Engineering,
Technion, Israel

Overview and structure of the course

SYLLABUS

Lecturer: Prof. Juri Belikov

Lab Assistant: Dr. Margarita Matson

Course webpage and resources:

- Moodle (enrolment key is **ITS8080**)
- Recurrent Teams video meeting (for remote participation)

Schedule (weekly):

- Lectures: Thursday at 10:00–11:30, ICT-315
- Practices: Thursday at 12:00–13:30, ICT-404

SCHEDULE

Week	Date	Topic	Comments
1	September 04	Introduction to the course	
2	September 11	Digital transformation of energy sector	
3	September 18	Workshop	Invited guests
4	September 25	Data Science Lifecycle	Project tasks
5	October 02	Basic typography and Data visualisation	
6	October 09	Data processing: Cleaning	
7	October 16	Data processing: Feature engineering	
8	October 23	SELF-STUDY WEEK	
9	October 30	Introduction to Time series analysis	
10	November 06	Statistical models for Time series	
11	November 13	Machine learning for Time series	Invited guest
12	November 20	Time series analysis: Forecasting	
13	November 27	Models with inputs	Invited guest
14	December 04	Optimal control of energy storage systems	
15	December 11	SELF-STUDY WEEK	
16	December 18	Presentations	

GRADING

In order to pass the course, you have to:

   ✓ **Submit** the project's report (max. 80pt, R)

   ✓ **Present** and defend your semester work (max. 20pt, P)

   ✓ Both report and presentation must be done

   ✓ Get at least 51% of the course total

The final grade is calculated as:
$$G = \left\lceil \frac{R + P - 50}{10} \right\rceil.$$

CLASS ORGANISATION

Course Project:

- Written report having problem statement/description, methods used, results, visuals, critical analysis, discussion, and conclusion.

- Presentation (~10+5 minutes). You must be able to explain to others what and how you have done.

- May be done in groups of up to 2 members.

- You may (and are encouraged to) collaborate with other students on discussing homework assignments, but the final report and implementation must be done independently.

- You may use any external sources, which must be cited in the report.

# EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)
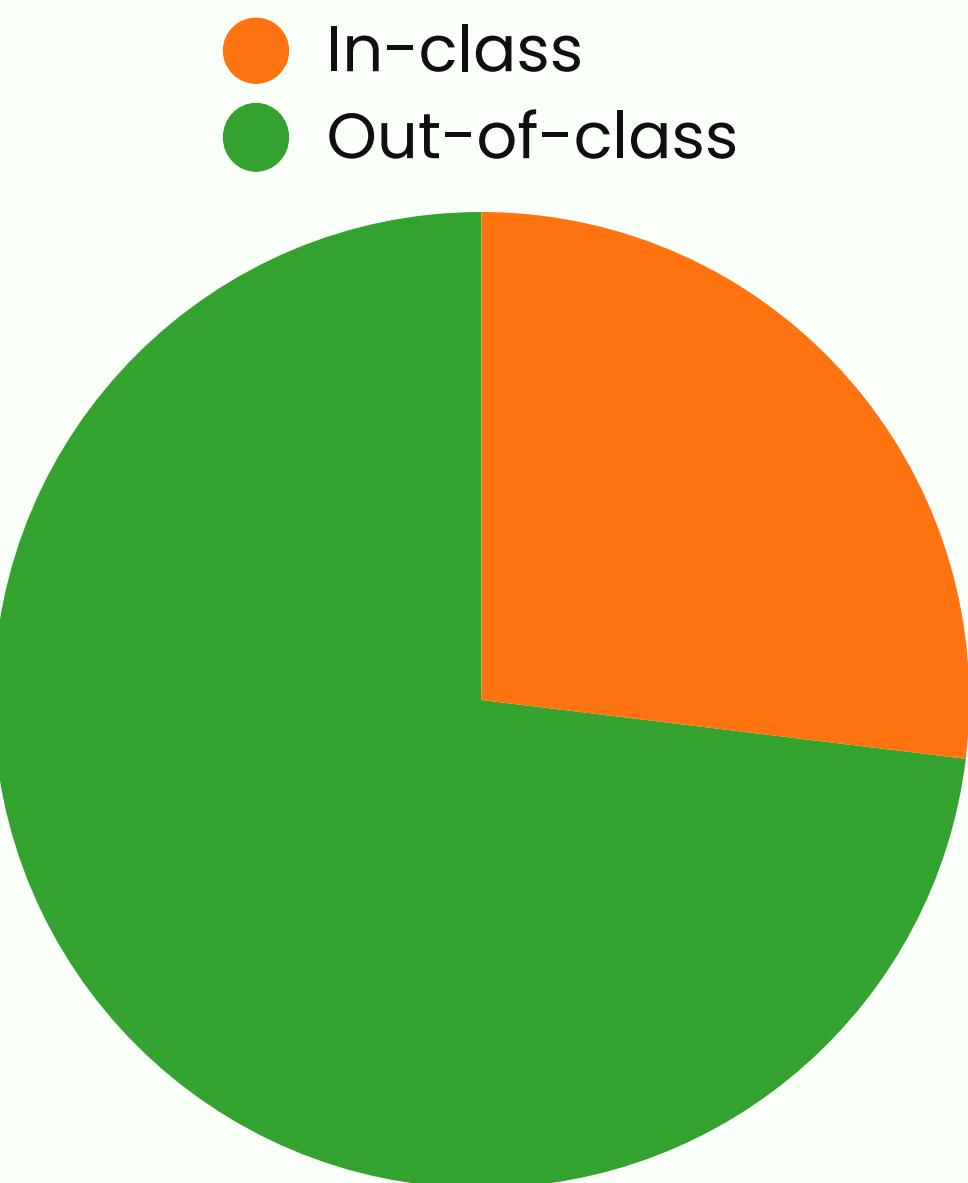
The volume of a course shall be calculated in

ECTS credits since the autumn semester of 2009

1 ECTS credit = 26 hours of work

6 ECTS credit = 156 hours of work

In-class activities are ~42h

Out-of-class activities are expected to be ~114h

● In-class
● Out-of-class

PREREQUISITES

Good if you have previous knowledge in:

- ✓ Mathematics (statistics, modelling, systems theory, etc)
- ✓ Data analysis
- ✓ Programming (Python, Matlab)
- ✓ Energy domain

LOOKING FOR ANSWERS?

Start asking questions ...

Who?   What?   When?   Where?

All questions are good, but some of
them deserve additional attention

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Start asking questions ...
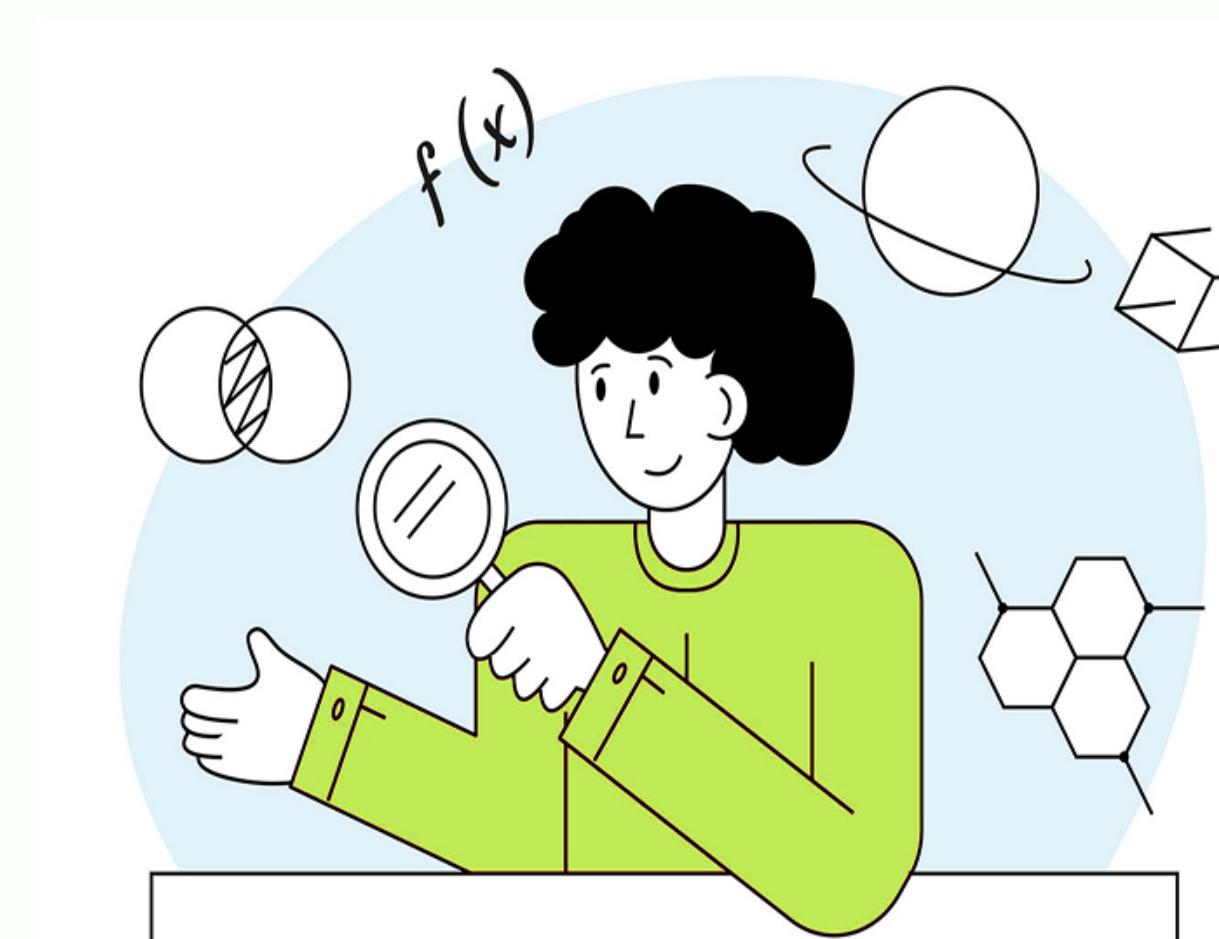
Who?   What?   When?   Where?

How?   All questions are good, but some of   **Why?**

them deserve additional attention

Questions?