

Seminar Winter Semester 2025/26

Seminar Energy Economics I: A Real-Time Probabilistic Day-Ahead Electricity Price Forecasting Challenge

Research Group “Energy Demand & Mobility”

This seminar introduces students to the theory and practice of probabilistic time series forecasting in the context of the German electricity market. Inspired by “*Learning to Forecast: The Probabilistic Time Series Forecasting Challenge*” (Bracher et al., 2023), students take part in an internal real-time forecasting competition while documenting their approach in a seminar paper.

Motivation:

Electricity price forecasting is central to energy economics, market operations, and renewable integration. A particularly timely development is the upcoming shift of the European Power Exchange (EPEX SPOT) to 15-minute resolution products in the Day-Ahead Market. The seminar simulates this environment: students submit predictions before gate closure (Day-1 at 11:59 am), replicating professional market conditions.

Course Structure:

This seminar starts with a kick-off meeting in which students are introduced to the framework conditions of the forecasting challenges (2 week forecasting period in end of January, metrics, submission guidelines), the seminar events, and the final seminar paper. At the core is a two-week forecasting challenge in which students submit daily probabilistic forecasts of all 96 quarter-hourly prices. Forecasts are emailed in a standardized format and tracked on an anonymized leaderboard.

The seminar unfolds in four phases:

1. Introduction & Background → electricity markets, day-ahead price formation, and fundamentals of probabilistic forecasting.
2. Literature Review & Methods → econometric, machine learning, and hybrid approaches to price forecasting.
3. Forecasting Challenge → daily submissions under real-time deadlines and uncertainty.
4. Seminar Paper & Presentation → seminar paper (introduction, literature, methods, results, conclusion) and final workshop presentation.

Learning Outcomes:

- Understand price formation and forecasting in the day-ahead market.
- Gain hands-on experience in developing and evaluating probabilistic models.
- Learn to handle real-time forecasting constraints.
- Write and present a research paper in applied forecasting.

Assessment:

Grades are based on (1) quality and timeliness of forecasts, (2) the seminar paper, and (3) active participation.

Dates:

Seminar Kickoff: Wed, 15 Oct 2025, 11:00–12:00 (on site: Seminar Room 017, IIP)

Midterm Presentation: Wed, 19 Nov 2025, 10:00–12:00 (on site: Seminar Room 017, IIP)

Final Presentation: Wed, 04 Feb 2026, 09:00–12:00 (on site: Seminar Room 017, IIP)

Attendance at all dates is mandatory.

Online registration must be completed before 13 Oct 2025, 00:00 via <https://portal.wiwi.kit.edu>. Confirmation of a seminar place is only valid once final registration has been made in the student portal (<https://campus.studium.kit.edu/exams/registration.php>).

Important: Please check your emails regularly after submitting your application in order to respond promptly to a seminar place offer! If you do not reply within the deadline, the place will be reassigned to other applicants.

Application Documents:

- Current transcript of records (Bachelor and, if applicable, Master)
- Short CV including relevant prior knowledge (please do not submit a motivation letter)

Contact:

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