The increasing availability of data, advances in computational and storage capacities of IT systems, and algorithmic advances in Artificial Intelligence (AI), especially Machine Learning (ML) combine to enable significant improvements in the efficiency, operations and throughput of manufacturing systems at the production level. The semiconductor industry is one of the most data-intensive industries and has seen increased use of AI-based technologies over the last few years. In order to develop effective AI-based technologies in the semiconductor manufacturing industry several issues have to be taken into account, including scalability, heterogeneity of data, and the need for interpretability.

The objective of this Special Issue is to showcase algorithmic advancements and (real-world) applications of AI-based methods for various planning, scheduling, and dispatching tasks in semiconductor supply chains. Contributions are invited that are based on (but not limited to) the following topics:

- ML for WIP management in the context of lot sampling, lot prioritization, dispatching, and machine loading, including batching and setup change rules as well as material release into the system
- Genetic programming for planning, scheduling, dispatching
- Markov decision processes for planning and scheduling
- Applications of constraint programming and constraint satisfaction in scheduling
- Applications of distributed AI (multi-agent systems, blackboards, expert systems), especially for planning and scheduling
- (Automated) mechanism design for planning, scheduling, for instance, design of automated negotiation approaches
- ML for making demand planning decisions
- AI for inventory management in the context of raw materials, equipment spares, and overall factory loading including positions and amounts
- AI for supplier selection
- AI for manufacturing system design
- AI for improvement and expansion of the automation systems including material handling, monitoring and data collection, as well as analysis and alarms
- AI for monitoring and response to the quality of incoming materials including raw or processed wafers, consumables such as liquids and gasses, substrates, etc.
- AI-based support of simulation
- Automated algorithm configuration and parameter tuning with applications to planning, scheduling, and dispatching.

**Important Dates:**

- Submission deadline: **March 1, 2022**
- Completion of first-round reviews: **July 1, 2022**
- Revised papers due: **October 1, 2022**
- Target of the second (last) round of reviews: **December 1, 2022**
- Target for sending the accepted manuscripts to the publisher: **February 1, 2023**

**Guest Editors:**

**Prof. John Fowler**  
Arizona State University (US)  
email: john.fowler@asu.edu

**Dr. Karl Kempf**  
Intel Corporation (US)  
email: karl.g.kempf@intel.com

**Prof. Lars Mönch**  
University of Hagen (Germany)  
email: Lars.Moench@fernuni-hagen.de

**Paper Submission:**

All papers must be submitted through Manuscript Central for *IEEE Transactions on Semiconductor Manufacturing*:  
https://mc.manuscriptcentral.com/tsx-ieee. Please select “Special Issue on Production-level AI” under Manuscript Category for your submission. All manuscripts must be prepared according to the *IEEE Transactions on Semiconductor Manufacturing* publication guidelines https://eds.ieee.org/publications/transactions-on-semiconductor-manufacturing. Please address inquiries to Lars.Moench@fernuni-hagen.de.