Summer School: The Journey to Industry 4.0 - From Operational Excellence to Advanced Manufacturing and Smart Supply Chains
July 13th 2020 – July 24th 2020

Course description

- Hours per week: 35 hrs/week, 2 weeks
- Semester: Summer 2020
- Number of credits/allocated workload: 70 contact hours
  3 U.S. credits recommended
  6 ECTS credits

The summer school is designed for advanced undergraduate and postgraduate students and will grant 6 ECTS (3 U.S. credits recommended) after oral and written examinations. Students should have an understanding of the basic concepts of Operations and Supply Chain Management and Operational Excellence, a list of pre-readings will be provided for those students who feel a need to recap on these concepts. Equally important students should be interested in and have a sufficient business strategy background for exploring the main future challenges, be it macroeconomic, socio-cultural or technological and elaborate the required concepts of operational excellence based on team work and interviews. A good level of English is required to be able to participate in the team work and discussions with managers, speakers and professors.

Course contents:

1. **Future Supply Chain Management (Prof. Krischke)**

   - Supply Chain and Operations Management in Germany
   - Challenges for the Supply Chain of tomorrow
   - Basics of Future Management
   - Relevant Megatrends
     - New products and markets
     - New Technologies
     - Changing Organisations and management
     - Changing Management of knowledge and people
   - Strategic Priorities of Future Supply Chains
   - Supply Chain Risk Management

Objective of the course:
The course focuses on the challenges the currently quite successful German Supply Chains will be facing in the years to come. The main megatrends relevant for these Supply Chains will be discussed in detail. The priorities for future supply chains will be elaborated and compared to the context of those markets the participants come from.

A special attention is given to Supply Chain Risk Management as one mayor approach to deal with the growing complexity in the forthcoming years. Selected topics will be discussed with help of cases and on site during the company visits.

Learning outcome:

- To understand the development and state of the art of supply chain and operations management of German companies
- To have an overview of the main future challenges
- To have some background in Future Management techniques and methods
- To be able to explain the relevant megatrends in detail
- Be able to identify challenges, trends and strategic priorities for specific companies during the company visits
- Have some background in Supply Chain Risk Management

2. Digital Operational Excellence (Prof. Spitznagel)

- Introduction to the concept of Operational Excellence
- Methods in Process Analyses and Optimization (resources and knowledge)
- Analyse value streams comprehensively
- Introduction to Digitalization, Automatization and Robotizing

Objective of the course:
The course focuses on the concept of Operational Excellence of German companies as a basis for digitalization. A long-established axiom in manufacturing is “if you automate a bad process you just do bad bigger and faster.” Therefore, a special focus is given to analysing and improving pro-cesses in an industrial context. During the company visits the participants will have the opportunity to see not only selected Improvements at work but also examples how these improvements build the basis for successful digitalization and automatization. The examples and related project will be presented and discussed from and with the managers in charge.

Learning outcome:

- To understand the concept of Operational Excellence as a basis for Digitalization
- To be able to analyse and improve processes by means of Operational Excellence
- Be able to identify challenges, trends and strategic priorities for the specific companies during the company visits
- To learn about the concept of digital Transformation
- Have some background on Industry 4.0.

3. Industry 4.0 (Prof. Spitznagel / Prof. Krischke)

- Introduction to the concept of Industry 4.0

- Strategy, goals and principles behind Industry 4.0
- Introduction to Cyber Physical Systems, Internet of Things and Bid Data
- Students will gain experience in working in international, intercultural and interdisciplinary teams

Objective of the course:
If you get into contact with German industry, you soon will be aware that most players relate to industry 4.0 without having an exact idea what industry 4.0 is about. In this module the students get an overview on industry 4.0. They learn about the idea, the strategy, the goals and principles behind industry 4.0. Industrial applications as well as research results will be discussed.

Learning outcome:
- In this module the students get an overview on industry 4.0
- The students learn about the idea, the strategy, the goals and principles behind industry 4.0.
- Industrial applications as well as research results will be discussed.

Instructional Methods:
- Topics will be covered and discussed through lectures, note sets and readings – and your knowledge will be assessed through participation and a final exam. Assigned readings will be the responsibility of the student and may not be part of the classroom lectures. Students are expected to have read the class text assignments and be prepared to make quality comments during class discussions.
- Students will be assigned to teams, with case assignments, for analysis and class presentation. Students not responsible for case presentation on that specific day will be expected to have analysed the case and be prepared to ask questions.
- Final exam: An exam will be given covering the materials in the text readings, cases, and all class assignments up to the exam date (short essays).

- **Grades and Policies:**

Class Participation and Attendance	70%
Final Exam	30%

A	93–100%
A-	90-92
B+	87-89
B	83-86
B-	80-82

C+	77-79
C	70-76

- **Language of instruction:** English
- **Prerequisites:** 60 ECTS in Business and Related Topic
- **Assessment Method:** Assignment
- **Text books:**
  - Simchi-Levi, Designing and Managing the Supply Chain, McGRaw-Hill, 2012
  - Suder, Gabriele: Doing Business in Europe, 2012
  - Sylvia Schroll-Machl : Doing Business with Germans. Their Perception, Our Perception, Vandenhoeck & Ruprecht 2011
  - Christopher. Martin: Logistics and Supply Chain Management, 2011
  - Beckmann, Sara: Operations Strategy, McGraw Hill 2008
  - Harrington, Lisa: X-SCM: The New Science of X-treme Supply Chain Management, Routledge Chapman & Hall 2010
- **Other recommended readings:**
  - Gleich, Ronald: Operational Excellence: Innovative Ansätze und Best Practices in der produzierenden Industrie, Haufe 2008
  - Loch, Christoph: Industrial Excellence: Management Quality in Manufacturing, Springer 2010
  - Loch, Christoph: Management Quality and Competitiveness: Lessons from the Industrial Excellence Award, Springer 2009
  - Abele, Eberhard: Global Production: A Handbook for Strategy and Implementation, Springer 2007
  - Abele, Eberhardt: Zukunft der Produktion: Herausforderungen, Forschungsfelder, Chancen, Springer 2012
  - Kouvelis: Handbook of Integrated Risk Management in Global Supply Chains, Wiley 2011
  - Simchi-Levi: Operations Rules: Delivering Customer Value through Flexible Operations, MIT Press 2010
  - Micic, Pero: The Five Futures Glasses: How to See and Understand More of the Future with the Eltville Model, Palgrave 2010
  - Pillkahn, Ulf: Using Trends and Scenarios as Tools for Strategy Development, Siemens 2008
  - Hofmann, Erik: The Supply Chain Differentiation Guide: A Roadmap to Operational Excellence, Springer 2012
  - Lee, Hau: Building Supply Chain Excellence in Emerging Economies, Springer 2006
  - Bolstorff, Peter: SC-Excellence, Mcgraw-Hill 2011
  - Koreb, Yoram: The Global Manufacturing Revolution, Wiley 2010

- Friedli, Thomas: Wettbewerbsfähigkeit der Produktion an Hochlohnstandorten, Springer 2012

- **Case Material (Selection)**
  - HSE Case 207-016: MAN AG's Acquisition Attempt of Scania AB, 2007
  - ICMR Case 303-1901: BMW's Innovation Strategies, 2003
  - WHU Case 305-538-1: FC Bayern Munich- Trophies for International Expansion
  - CIIL Case 0-606-009: Aldi: A German Retailing Icon, 2005
  - HBR Case 9-189-089: Siemens Electric Motor Works
  - WHU Case 303-075-1: Puma AG, 2003
  - HBR Case 9-606-053: RFID at the METRO Group, 2009
  - IMD Case IMD-6-0249: The "mi adidas" mass customization initiative, 2002
  - St. Gallen Cases 310-114-1: Siemens Management Innovation at the Corporate Level, 2010
  - IBS Cases 304-197-1: Turning around Porsche, 2004

- **Reference Material**

  - IBM: The smarter Supply Chain of the future, 2010
  - DHL: Delivering Tomorrow, 2010
  - WEF: The Global Competitiveness Report 2010–2011, 2010
  - CILT: Logistics and transport . Vision 2035, 2010
  - BMBF-Kongress: 10. Karlsruher Arbeitsgespräche Produktionsforschung 2010

Name of lecturers:
Prof. Dr. André Krischke (Munich University of Applied Sciences)
Prof. Dr. Jürgen Spitznagel (Munich University of Applied Sciences)