**Supply Chain Dynamics (SCD)**

Summer term 2019, version: 29/03/2019

Please note: This document reflects our planning before the term started; it will **not** be updated regularly. For short-term changes regarding rooms or times, see Campus. Changes regarding the content will be discussed in class and, if appropriate, communicated via Ilias.

Technicalities

One semester course, taught every second semester in the summer term

Six credit points; on average, four contact hours per week. Taught in English

Course coordinator and lecturer: Prof Dr Andreas Größler; tutorials: Ivan Ðula and Manuel Brauch

Part of the MSc study programme in (technically oriented) business administration

Time and location

Classes: Mondays, 15:45–17:15 in KII M 17.73 and Thursdays, 17:30–19:00 in KII M 17.73

First class: Monday, 15 April, 15:45, then every week on Monday and Thursday until term ends (details see time table)

Recommended requirements

Introductory bachelor level course in operations management and/or supply chain management

Short description and learning goals

The course starts with discussing the nature of supply chains, in particular their dynamic aspects. Students acquire first-hand experience on effects of dynamic behaviour. A major part of the course is devoted to learning a methodology for better understanding and controlling supply chains, system dynamics. It is used to analyse some real-world cases of dynamic supply chain issues.

After successfully finishing the course, students can:

* name and discuss sources and effects of dynamics in supply chains;
* develop simple supply chain models with the system dynamics;
* understand and evaluate complex dynamic supply chain models.

Course design

Although officially split into lectures and tutorial sessions, all classes consist of theoretical and practical parts. Thus, the content will run over the two sessions per week with teacher presentations, case study work, modelling exercises, and experiential learning elements. Students are expected to attend all sessions and actively engage in classroom discussions. They are supposed to study the reading assignments before class.

|  |  |  |  |
| --- | --- | --- | --- |
| **Course element** | **Quantity** | **Time required** | **Total [h]** |
| Contact hours |  |  |  |
| Interactive lectures | 23 | 2 h | 46 |
|  |  |  |  |
| Self-study |  |  |  |
| Reading assignments | 404 pp. | 98.5 h | 98.5 |
| Preparation of modelling cases | 7 | 2 h | 14 |
| Exam preparation | 1 | 20 h | 20 |
|  |  |  | *132.5* |
| Examination |  |  |  |
| Written exam | 1 | 1.5 h | 1.5 |
|  |  |  |  |
| **Total** |  |  | **180** |

Assessment

Assessment will be carried out by means of a written exam (90%) and a multiple-choice mid-term assessment during a regular class (10%; see timetable for date). The mid-term assessment cannot be retaken or be written at another time.

Depending on the total number of students not being too big, 20% of points (from the written exam) can be substituted by a classroom presentation of one of the cases from Ackermann’s book (dates see timetable) in groups of two or three students. This includes that groups submit a presentation file before class, update it based on feedback received in class, and upload it to Ilias.

In total, 50% of all points are necessary to pass the course with 6 credit points. The content of the exam comprises all topics discussed in class plus all required reading assignments (see timetable).

Time table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | | **Date** | **Topic** | **Case from Akkermans** | **Reading assignment** |
| 16 | C1 | Mon, 15/04 | Introduction to and motivation for course |  |  |
| C2 | Thu, 18/04 | Experience dynamics!  The Beer Distribution Game |  |  |
| 17 | C3 | Thu, 25/04 | Beer Distribution Game: debriefing  Systemic causes of supply chain dynamics |  | Senge (1990), ch. 3 |
| 18 | C4 | Mon, 29/04 | Behavioural causes of supply chain dynamics  The case for modelling and simulation |  | Sterman (2000), ch. 1 |
| C5 | Thu, 02/05 | An introduction to system dynamics |  | Sterman (2000), ch. 4 |
| 19 | C6 | Mon, 06/05 | Operational causes of supply chain dynamics |  | Lee et al. (1997) |
| C7 | Thu, 09/05 | Practice session: identifying stocks and flows, feedback loops |  | Sterman (2000), ch. 6 |
| 20 | C8 | Mon, 13/05 | Simple dynamic inventory models |  | Sterman (2000), ch. 7.1&8.3 |
| C9 | Thu, 16/05 | Hands on session: getting to know Vensim |  | Kirkwood (2005) |
| 21 | C10 | Mon, 20/05 | Mid-term assessment  Growth dynamics of organizations |  | Sterman (2000), ch. 8.1, 8.2, 8.4, 8.5 |
| C11 | Thu, 23/05 | Practice session: modelling exercises I |  |  |
| 22 | C12 | Mon, 27/05 | Course evaluation  Aging chain models and their behaviour | Market growth dynamics, ch. 6 | Sterman (2000), ch. 12.1 |
| 23 | C13 | Mon, 03/06 | Business cycles and oscillations | Information sharing, ch. 5 | Sterman (2000), ch. 17 |
| C14 | Thu, 06/06 | Practice session: modelling exercises II |  |  |
| 24 | *No classes: Pentecost holidays* | | | | |
| 25 | C15 | Mon, 17/06 | Dynamic production/supply chain models | Curse of cyclicity, ch. 4 | Sterman (2000), ch. 18 |
| 26 | C16 | Mon, 24/06 | Validity of system dynamics models and implementation issues | Aircraft development, ch. 8 | Sterman (2000), ch. 21 |
| C17 | Thu, 27/06 | Practice session: modelling exercises III |  |  |
| 27 | C18 | Mon, 01/07 | *Guest lecture: Alexander Zock, PhD -- Irrelevance, irrationality and irresponsibility, the three curses of the organizational use of System Dynamics* | | |
| C19 | Thu, 04/07 | Practice session: modelling exercises IV |  |  |
| 28 | C20 | Mon, 08/07 | Archetypal dynamic behaviour and modelling modules | Ramp-up in service supply chains, ch. 9 | Senge (1990), app. 2 |
| C21 | Thu, 11/07 | Practice session: modelling exercises V |  |  |
| 29 | C22 | Mon, 15/07 | Summary: Modelling and simulation as research methods | Decision traps in projects, ch. 7 | Sterman (2000), ch. 22 |
| C23 | Thu, 18/07 | Q&A | Buyer-supplier relationships, ch. 10 |  |

References to readings/cases

Akkermans, H. (2014): Supply Chain Dynamics – Mastering Disruptive Change in Innovation-Driven Industries, Educatieve Uitgeversgroep [ISBN 978-94-002-1608-2].

Kirkwood, C.W. (2005): Vensim PLE Quick Reference and Tutorial, available at [http://www.public.asu.edu/~kirkwood/sysdyn/SDRes.htm](http://www.public.asu.edu/%7Ekirkwood/sysdyn/SDRes.htm).

Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: the Bullwhip effect. *Management Science,* 43(4), 546-558.

Senge, P.M. (1990): The Fifth Discipline – The Art and Practice of the Learning Organization, Currency Doubleday.

Sterman, J.D. (2000): Business Dynamics – System Thinking and Modeling for a Complex World, Irwin McGraw-Hill.

Software

Download and install Vensim PLE on your computer: <http://vensim.com/free-download/>.