



Supply Chain Dynamics (SCD)

Summer term 2021, version: 19/04/2021

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 Đula

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

Time and location

Classes (online): Mondays, 15:45–17:15 and Thursdays, 17:30–19:00 (partially, pre-recorded, partially live; see timetable)

First class: Thursday, 22 April, 17:30 (online live)

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 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 required readings before class.

Course element	Quantity	Time required	Total [h]
Contact hours			
Interactive lectures	23	2 h	46
Self-study			
Required reading	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

A forum has been opened in Ilias for regular communication between students and teachers, and amongst students.

Examination

Examination will be carried out by means of a written homework assignment. In total, 50% of all points are necessary to pass the course with 6 credit points. The homework assignment asks you to integrate all parts of the course, including lectures, tutorials, and required readings (see timetable). Deadline of the assignment is Friday, 30 July 2021, 12:00 noon, submission by Ilias; by the beginning of July, all topics necessary to answer the assignment will have been covered. A detailed description of the assignment together with a framework document will be provided on Ilias. You need to register for the examination on Campus between 12 May 2021 and 10 June 2021. NB: in case you want to withdraw from the examination, this needs to be done by 10 June 2021.

Timetable

Week	Date	Topic	Teacher	Mode	Required reading	
16	C1	Thu, 22/04	Introduction to and motivation for course	AG	online live	McKinsey (2020)
17	C2	Mon, 26/04	Experience dynamics! The Beer Distribution Game	ID	online live	

	C3	Thu, 29/04	Beer Distribution Game: debriefing Structural causes of supply chain dynamics	AG	online live	Senge (1990), ch. 3
18	C4	Mon, 03/05	Operational causes of supply chain dynamics	AG	recorded	Lee et al. (1997)
	C5	Thu, 06/05	Behavioural causes of supply chain dynamics The case for modelling and simulation	AG	recorded	Sterman (2000), ch. 1
19	C6	Mon, 10/05	An introduction to system dynamics	ID	online live	Sterman (2000), ch. 4
20	C7	Mon, 17/05	Simple dynamic inventory models	AG	recorded	Sterman (2000), ch. 6
	C8	Thu, 20/05	Practice session: identifying stocks and flows, feedback loops	ID	online live	Sterman (2000), ch. 7.1&8.3
21	<i>No classes: Pentecost holidays</i>					
22	C9	Mon, 31/05	Hands on session: getting to know Vensim	ID	online live	Kirkwood (2005)
23	C10	Mon, 07/06	Growth dynamics of organizations	AG	recorded	Sterman (2000), ch. 8.1, 8.2, 8.4, 8.5
	C11	Thu, 10/06	Practice session: modelling exercises I	ID	online live	
24	C12	Mon, 14/06	Aging chain models and their behaviour	AG	recorded	Sterman (2000), ch. 12.1
	C13	Thu, 17/06	Business cycles and oscillations	AG	recorded	Sterman (2000), ch. 17
25	C14	Mon, 21/06	Dynamic production/supply chain models	AG	recorded	Sterman (2000), ch. 18
	C15	Thu, 24/06	Practice session: modelling exercises II	ID	online live	
26	C16	Mon, 28/06	Validity of system dynamics models and implementation issues	AG	recorded	Sterman (2000), ch. 21

	C17	Thu, 01/07	Practice session: modelling exercises III	ID	online live	
27	C18	Mon, 05/07	Archetypal dynamic behaviour and modelling modules	AG	recorded	Senge (1990), app. 2
	C19	Thu, 08/07	Practice session: modelling exercises IV	ID	online live	
28	C20	Mon, 12/07	Guest lecture	Dr Myrjam Beintner, Wipro (AG)	online live	
	C21	Thu, 15/07	Practice session: modelling exercises V	ID	online live	
29	C22	Mon, 19/07	Summary: Modelling and simulation as research methods	AG	online live	Sterman (2000), ch. 22
	C23	Thu, 22/07	Q&A	ID	online live	Saltelli et al. (2020)
30		Fri, 30/07	12:00 noon, deadline for submission of homework assignment on Ilias			

Online-live classes will be conducted on Webex with the following link:

<https://unistuttgart.webex.com/meet/andreas.groessler> (when teacher is AG) or

<https://unistuttgart.webex.com/meet/ivan.dula> (when teacher is ID). Please switch on your camera but mute your microphone (unless you want to say something, of course). Recorded lectures will be provided on Ilias.

References to readings/cases

Kirkwood, C.W. (2005): Vensim PLE Quick Reference and Tutorial, available at

<http://www.public.asu.edu/~kirkwood/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.

McKinsey & Company (ed.) (2020): Demystifying modeling: How quantitative models can—and can't—explain the world.

Saltelli, A. et al. (2020): Five ways to ensure that models serve society: a manifesto, *Nature* Vol. 582, 25 June, 482–484.

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/>.