

AGENT-BASED MODELING IN ECONOMICS AND BUSINESS

COURSE OUTLINE SUMMER 2020

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CONTENT

This module is an introduction to agent-based modeling and simulation. Agent-based modeling recently has become more and more popular both in research and practical applications in business and policy. This method can be applied to a large variety of practical and academic questions both in business and in economics. It has been used to study problems in marketing, organizational research, human research, but also in financial economics, industrial economics and macroeconomics.

The module covers technical aspects of agent-based modeling and simulation such as how to set up a model, how it can be analyzed and how it can be implemented on a computer. After finishing the course, you will be able to program your own small model for a research project or the bachelor thesis.

In this semester we will apply agent-based modeling to the spreading of the Corona virus. We demonstrate how agent-based models can be used to understand this phenomenon and to analyze the effects of various policy measures to fight the pandemic.

MODULE OBJECTIVES

- You understand potential and limitations of agent-based modeling and simulation.
- You learn how to work with ABM and how to interpret their results.
- You acquire basic knowledge to implement your own agent-based models.
- You will learn how to use the ABM programming platform NetLogo.

PREREQUISITES

You will need very good skills in written and spoken English. Some affinity to computer programming would be helpful.

Please make sure to install the newest version of NetLogo (v6.1.1) on your computer before the beginning of the course.

ORGANIZATION

This seminar is designed as blended learning course. It provides a mix of online education materials and opportunities with your instructors. Here, the instructors will guide you through the materials, they answer questions and they give you structure and orientation. Accordingly, it is important that you study the material on your own and ask questions. The material is available on Moodle.

We will have 6 online sessions via Zoom in which you attend 1 lecture and 5 seminar sessions. In order to benefit most from these sessions, it is important that you prepare them.

Every week, you will get another assignments, which you have to solve. For each assignment, you can get points, which in sum will determine your final grade in the end. You do NOT need to write an extra term paper.

We will develop a pandemic simulation model, which will mirror the current Corona situation. Here, we focus on the spread and potential policies to fight the virus. In order to create such a model, you will get small programming exercises.

NOTE: Online attendance is obligatory! You can be absent max. 1 time. If you miss the online sessions more often, you cannot continue with the course.

Participants: 20

Assessment: Total points of all 7 assignments (max. 100 points)

Time and place: Online sessions start at **14:15h and end at 15:45h on Zoom**. We will send out the respective link on Moodle. They will take place as follows:

Date	Format
April 21, 2020	Lecture
April 30, 2020	Tutorial
May 7, 2020	Tutorial
May 14, 2020	Tutorial
May 19, 2020	Tutorial
May 28, 2020	Tutorial

Start: Tuesday, April 21st, 2020 via Zoom

REGISTRATION

Students enrolled in the Management and Economics program:

It is necessary to register for this module in FlexNow **and at the chair**, because the number of places is limited to **15**.

Students enrolled in the Applied Computer Science:

It is necessary to contact the “Zentrum für ökonomische Bildung” (ZfÖB) as early as possible for the registration. Also you need to **register at the chair**, since the number of places is limited to **5**.

The **registration procedure at the chair** consists of two steps:

1. You have to sign in to the Moodle course by 15.00h on April 20, 2020.
2. You have to attend the first online session. We will send the respective link to join Zoom via Moodle.

If there are more than 20 applications, we will choose participants randomly.

If there are free places available, you can join the course after the first round of registrations.

The registration phase in FlexNow is: 21.04.2020 – 07.05.2020.

MOODLE

There is a Moodle course for this module. No password is required for the registration. Study materials and exercises will be provided on Moodle.

The Moodle course is

Agent-based modeling in economics and business (073085-SoSe20)

Please sign into the Moodle course as soon as possible and make yourself familiar with the materials.

READING

The following literature helps for a better understanding and give a good introduction to ABM. It's recommended to read and work with these publications.

Books:

'An Introduction to Agent-Based Modeling ' by Uri Wilensky and William Rand
(ISBN: 978-0262731898)

'Agent-Based and Individual-Based Modeling' by Steven F. Railsback and Volker Grimm
(ISBN: 978-0-691-13673-8)

Short papers:

Bonabeau, E. (2002). Predicting the Unpredictable. Harvard Business Review 80(3), 109 – 116.

Tesfatsion, L. (2003). Agent-based computational economics: Modeling economies as complex adaptive systems. Information Sciences 149(4), 263 – 269.

Twomey, P. and R. Cadman (2002). Agent-based modelling of customer behaviour in the telecoms and media markets. info 4(1), 56 – 63.