

Short course

Introduction to Agent-Based Computational Modelling in Population Studies (announced on 13/2/2015)

- Organizers** Research Group Family and Population Studies (FaPOS), Center for Sociological Research, KU Leuven
(<http://soc.kuleuven.be/web/home/6/30/eng>)
Scientific Research Network Historical Demography (FWO Flanders)
(<http://soc.kuleuven.be/ceso/historischedemografie/eng/index.html>)
- Partners** Interuniversity Institute for Biostatistics and Statistical Bioinformatics (I-BioStat): Center for Statistics CenStat, University of Hasselt
(<http://www.uhasselt.be/censtat>)
Leuven Biostatistics and Statistical Bioinformatics Centre (L-BioStat)
(<https://gbiomed.kuleuven.be/english/research/50000687/50000696/>)
Doctoral School of Human Sciences, Vrije Universiteit Brussel
(<https://my.vub.ac.be/phd/dsh>)
- Co-funders** This workshop has been co-funded by the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013) / ERC Grant Agreement no. 312290 for the GENDERBALL project and by the KU Leuven GOA-project New approaches to the social dynamics of long-term fertility change.
- Location** KU Leuven, Raadzaal (SW 00.113), Parkstraat 45, 3000 Leuven, Belgium
(<http://soc.kuleuven.be/fsw/contact/campusleuven#section-3>)
- Course coordinator** Hideko Matsuo (Senior researcher and coordinator project New Approaches to the Social Dynamics of Long-Term Fertility Change), Family and Population Studies, Center for Sociological Research, KU Leuven
- Confirmed instructors and lecturers** Jakub Bijak (Guest lecturer, Department of Social Sciences: Social Statistics and Demography, University of Southampton)
Andreas Flache (Guest lecturer, Department of Sociology, University of Groningen)
André Grow (Main instructor, Family and Population Studies, Center for Sociological Research, KU Leuven)
Sylvia Wenmackers (Guest lecturer, Institute of Philosophy, KU Leuven)
Frans Willekens (Guest lecturer, Max Planck Institute for Demographic Research)
- Course description** Agent-based computational (ABC) modelling is a relatively new approach to research in the social sciences. In ABC modelling, societal phenomena such as the emergence of social institutions, social segregation, and the spread of innovations are studied from the 'bottom up', by modelling the behavior and interactions of the individuals that make up society.
An increasing number of scholars advocate the use of ABC modelling in

population research. The premise is that ABC modelling offers a number of benefits, such as:

- (1) Enhanced theory formation by better linking the micro-level with the macro-level.
- (2) The ability to represent populations more adequately as complex systems.
- (3) Providing a laboratory in which rare events and the implications of alternative mechanisms can be studied.

The increasing number of ABC modelling studies published in the main scholarly journals in population studies shows that the merits of the approach receive increasing recognition in the field. Yet, at the same time many scholars are still reluctant to employ ABC modelling in their own research. Important reasons for this are:

- (1) Lacking understanding of the benefits of the method.
- (2) Lacking knowledge about the types of research questions that can be fruitfully addressed with ABC modelling.
- (3) Lacking experience and training in simulation modelling and software development.

The goals of this course are:

- (1) To introduce participants to ABC modelling in population studies.
- (2) To provide them with theoretical background on ABC modelling and to provide them with an understanding of its benefits and uses.
- (3) To make them acquainted with the most important concepts and tools in developing agent-based models.
- (4) To introduce participants to NetLogo as a platform for designing their own agent-based models.

Learning outcomes The course will provide participants with knowledge in four areas:

- (1) Participants will learn about the benefits of agent-based models and about the type of research questions that can be addressed with such models.
- (2) They will know about existing agent-based models in different areas of population research, such as mate search, fertility, and historical demography.
- (3) They will be able to develop basic models of population dynamics with the modelling platform NetLogo.
- (4) They will be able to design and analyze systematic computational experiments for answering research questions.

Course setup The course consists of five full days, each with a morning session (09:00 - 12:00) and an afternoon session (13:00-16:00). Sessions are based on a mixture of lectures and computer labs.

On the last day, there will be group discussions in which participants present mini-proposals for using ABC modelling in their own research. During this session, participants will receive feedback from instructors and other participants.

Lectures and computer labs will take place in the Raadzaal at the Faculty of Social Science building. Students need to bring their own laptop for participation in the computer labs.

**Course overview/
schedule** *Day 1 (Monday, June 1)*

- Morning: Guest lecture
- Afternoon: Guest lecture
- Welcome dinner with guest lecturers and participants

Day 2 (Tuesday, June 2)

- Morning: Computer lab
- Afternoon: Computer lab

Day 3 (Wednesday, June 3)

- Morning: Computer lab
- Afternoon: Computer lab

Day 4 (Thursday, June 4)

- Morning: Guest lecture
- Afternoon: Computer lab

Day 5 (Friday, June 5)

- Morning: Participant presentations and group discussions
- Afternoon: Participant presentations and group discussions
- Closing event: Guest lecture

Requirements Participants need to submit a one-page mini-proposal in which they outline their interests in/plans for applying ABC modelling.

The proposals should include information such as participants' field of study, their study focus/research questions, theoretical frameworks to be used in their research, potential data sources, and expected outcomes.

This proposal will be used as a basis for group discussions on day 5.

Application procedure Those who are interested in participating in the course should apply with the following documents to the course coordinator (Hideko.Matsuo@soc.kuleuven.be):

- (1) Biographical information.
- (2) For PhD candidates, a statement of support from their supervisor.
- (3) One-page mini-proposal.

The early bird application deadline is February 20 2015; feedback about acceptance will be send out by March 15 2015.

The regular application deadline is April 1 2015; feedback about acceptance will be send out by April 15 2015.

All submitted documents will be assessed through the scientific committee (FaPOS/I-BioStat/L-BioStat). Incomplete applications will not be considered.

Admission and fees The number of participants is limited to 15. Selection will be based on the content of the mini-proposal. Priority will be given to those who have applied for the early bird deadline.

The course fee is 300€ (students affiliated at Flemish universities - see below). The fee includes lectures, computer labs, luncheons, coffee breaks, a joint dinner, and a closing reception. Participants need to pay for their own accommodation and travel expenses.

The course fee might be waived for researchers affiliated at Flemish universities subject to securing external Flemish government funding.

General readings Billari, F., & Prskawetz, A. (Eds.). (2003). *Agent-Based Computational Demography – Using Simulation to Improve our Understanding of Demographic Behavior*. Heidelberg: Physica Verlag.

Epstein, J. M., & Axtell, R. L. (1996). *Growing Artificial Societies: Social Science from the Bottom Up*. Washington, D.C.: Brookings Institution Press/MIT Press.

Gilbert, N. (2008). *Agent-Based Models*. Thousand Oaks: SAGE Publications.

Macy, M. W., & Willer, R. (2002). From Factors to Actors: Computational Sociology and Agent-Based Modeling. *Annual Review of Sociology*, 28, 143–166.

Macy, M. W., & Flache, A. (2009). Social Dynamics From the Bottom Up: Agent-Based Models of Social interaction. In P. Hedström & P. Bearman (Eds.), *The Oxford Handbook of Analytical Sociology* (pp. 245–268). Oxford: Oxford University Press.

Location of the workshop

The workshop will take place in the Raadzaal (SW 00.113) at the Faculty of Social Sciences, Parkstraat 45 in Leuven. The Raadzaal is immediately on the left of the main entrance of the Faculty of Social Sciences building. All additional relevant information on contact address, routing, precise location in Leuven and a building plan of the faculty can be found at the following website:

<http://soc.kuleuven.be/fsw/english/contact/campusleuven#section-3>

Access by train – All train arrivals/departures information are available at the homepage of the Belgian railway company NMBS (<http://www.belgianrail.be/en>). The workshop venue is approximately 15 minutes walk from the train station.

A walking route between the train station and workshop venue can be obtained by the following link:

<https://www.google.be/maps/dir/Bibliotheek+Sociale+Wetenschappen,+Parkstraat+45,+3000+Leuven/Station+Leuven,+Martelarenplein+16,+3000+Leuven/@50.8772003,4.7003318,15z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1s0x47c161285f216c23:0xcd3d588105695d6a!2m2!1d4.7036!2d50.873488!1m5!1m1!1s0x47c1672cad4fc3e7:0x7986b49e27588b77!2m2!1d4.715682!2d50.881365!3e2>

Access by plane – Brussels Airport (Zaventem) is at about 20 kilometers distance from Leuven. You can reach Leuven by taking a train from the airport (approx. 20 minutes).

General information about Leuven

All other general information about Leuven can be found at the following website.

<http://www.leuven.be/en/tourism/>

List of hotels

There are ample hotels and hostels available at the city of Leuven. Websites:

Hotels <http://www.leuven.be/en/tourism/staying/hotels/>

Hostels <http://www.leuven.be/en/tourism/staying/hostels/>