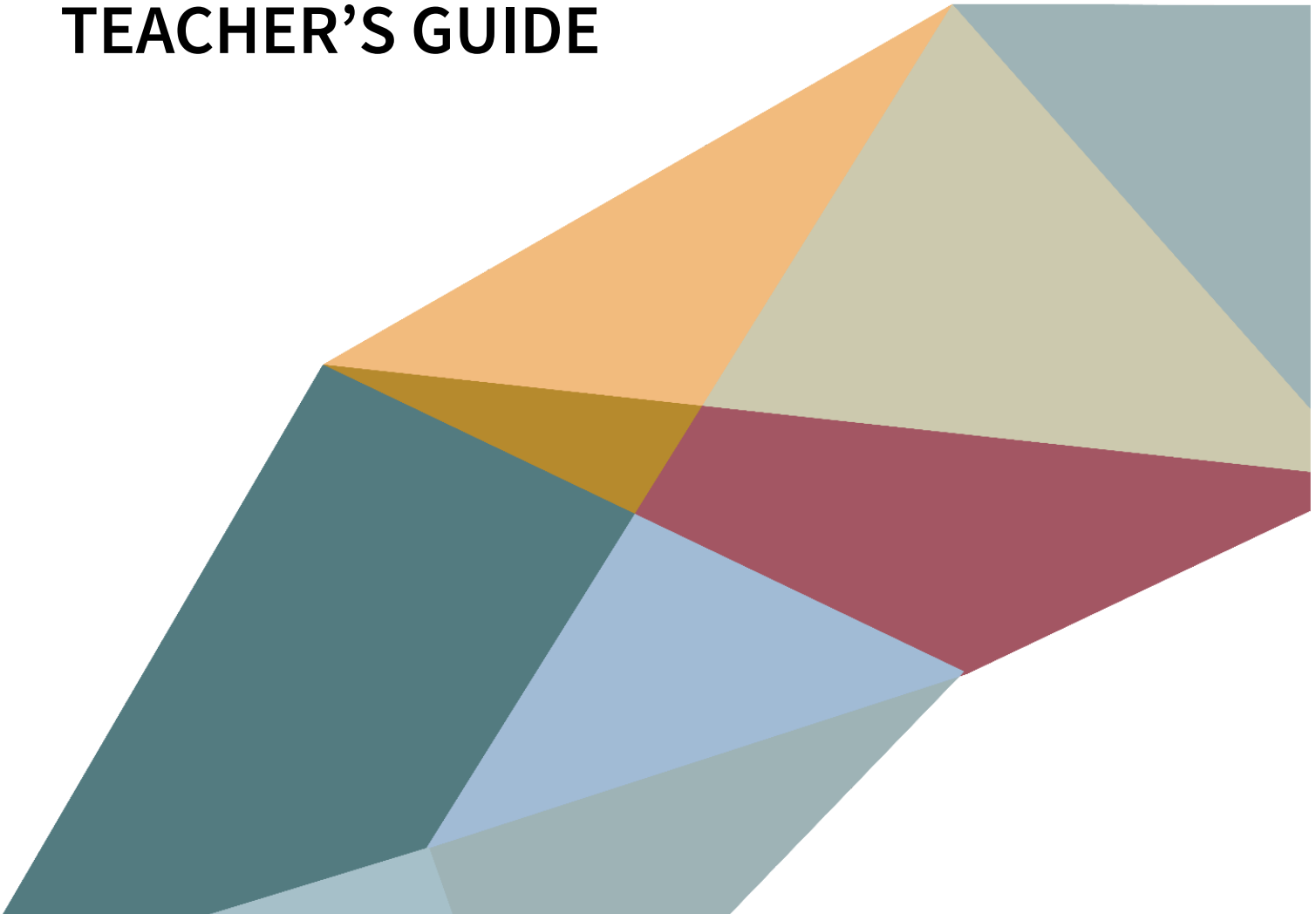
ACTISS
ACTION FOR COMPUTATIONAL THINKING
IN SOCIAL SCIENCES

THEMATIC COURSE

Decision Making in a Complex World: Using Computer Simulations to Understand Human Behaviour

# TEACHER'S GUIDE



THEMATIC COURSE

# Decision Making in a Complex World: Using Computer Simulations to Understand Human Behaviour

# TEACHER'S GUIDE

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# GENERAL GUIDELINES FOR TEACHERS

Within ACTISS we are creating and producing open online courses that introduce the basics of computational social science. Our interactive courses are made with two types of audiences in mind:

- individual learners who want to study by themselves -> massive open online courses (MOOCs), available for free on Futurelearn platform
- academic teachers who would like to enrich their courses with engaging and easily accessible materials -> materials available at actiss-edu.eu

The materials available on the website are prepared on the basis of our Futurelearn courses but they are designed in such a way that makes it easy to incorporate them in your courses.

## ENGAGING AND ACCESSIBLE CONTENT

It is worth noting that all ACTISS courses are designed in such a way that no prior mathematical and programming skills are required from students. The courses can be used as an easy and engaging introduction to more advanced courses.

In all courses within the ACTISS programme we want to provide people who identify as having 'no brain for science' (a fear for computation and formulas) with a very gentle introduction to Computational Social Science, to pen-and-paper formal models and to Agent-Based Models. We want to build up interest in this domain and their confidence in this area. By the end of the course we want the learners to be able to experience how modelling and simulations can help understand social phenomena and to experience how investigating a social phenomenon with the use of an Agent-Based Model works. We also want them to be aware of the potential benefits of using a computational approach to practical situations and be willing to try them out.

## HOW TO USE COURSE MATERIALS?

- We encourage you to use the materials to enrich your courses. You can download all the materials for the course and use them:
  - as a whole segment (e.g. 12 hours of a 60 hour long seminar)
  - or pick the elements that best suit your needs (e.g. use some videos and exercises as homework for students and then discuss the homework during a meeting).
- Educational materials are divided in weeks (units) and each week consists of a series of appr. 20 small steps:
  - short articles - max.1000 words, usually followed by a discussion prompt,

    - short videos - max. 6 minutes (links are included in the text),
    - discussion questions,
    - exercises (if they relate to models, links are included in the text),
    - quizzes (2-6 questions to check student understanding)
- Some steps may be used as a homework assignment (articles, videos, exercises), some can be used within a classroom setting (discussion questions, exercises, quizzes)
- In each course there are some NetLogo models that were designed for the course or adjusted to the needs of the course. A complete list of models is available on the project's website and also on project's Github.
- Educational materials are downloadable as a set of pdf files, each containing one week's materials preceded by a list of steps and followed by a list of correct answers to all quizzes
- The best way to browse the materials for the course is to first check the Curriculum document and check out the documents for specific weeks/units (especially short description at the beginning of all such documents) or, provided a certain course is available on Futurelearn, to enrol to the course and go through the steps there.
- Additional exercises and educational scenarios are provided at the end of each Teacher's Guide. These are mainly exercises that take longer time to complete or require more teacher's support, or require some group work, or can be used as a basis of a whole lesson/meeting.

## **GUIDELINES FOR TEACHERS RELATED TO:** Decision Making in a Complex World: Using Computer Simulations to Understand Human Behaviour

The topic of this course is decision making in the complex world that we live in. The unique approach presented within the course encompasses not only conventional theories about social norms but also cutting-edge computer simulation frameworks that help make sense of human behaviour.

## COURSE STRUCTURE

**Week 1: Modelling individual choices**

This week we will reflect on how people make decisions and judgments. We will think about what a rational decision is and how it can be modeled. We will see how choice behavior may change depending on the circumstances. Finally we will discuss the theory of bounded rationality developed by psychologists and economists and see how it can help us understand choices when information available is scarce and cannot be relied upon.

**Week 2: The social dimension**

This week we will reflect on the social dimension of how people make decisions. When we make decisions as humans, we take advantage of the information that is around us, to help us inform what the best decision is. New elements will be added to models of decision-making and we will use simulations to explore how these elements change the process and results.

**Week 3: Integrating decision making into models**

In the previous week, we started slowly to include new elements into the simulations. We added exploration, information exchange, normative influence and network density as factors. This week we will explore a bit deeper what different aspects of human decision making and behaviour can be integrated in computational models.

# ADDITIONAL MATERIALS

The materials below can be used as homework assignments or within a classroom setting. All elements listed below provide materials for a total of. 6-8 hours of workload.

## Why model?

Models are traditionally often being used for prediction. However, very often social systems can develop in different directions, and small causes may have large effects. To discuss the many different reasons to model, the following paper (open access) by Joshua Epstein is a good read to prepare for a discussion on the many different reasons to model.

Epstein, Joshua M. (2008). 'Why Model?'. Journal of Artificial Societies and Social Simulation 11(4)12 <https://www.jasss.org/11/4/12.html>.

## Focusing on opinion dynamics

Opinion dynamics is a very timely topic, and many elaborated social simulation models are being used to unravel the complex dynamics of opinion dynamics such as changes in norms, transitions and polarisation and conflict. The Journal of Artificial Societies and Social Simulation is open source and has a convenient search tool to find papers on specific opinion dynamic situations. Oftentimes the links to the models are being shared, and it is interesting to let students explore a model and discuss its relevance for understanding and possibly managing real world cases.

Link: https://www.jasss.org/JASSS.html

-> example of a homework task: Browse through JASSS papers and choose 3 articles on a certain topic (e.g. environmental models, consumption, innovation, collective behaviour). Prepare a short presentation for other students describing the results.

## Environmental relevant behaviour

One domain where social simulation models are widely used is to explore the social dynamics related to environmental issues. This addresses changes in societal behaviour related to fuel consumption, travel behaviour, food consumption, isolation of homes etcetera. In a class a specific topic can be selected, and a model can be explored that is targeting the behaviour of people in this domain. An overview of models addressing environmentally relevant behaviour is provided by the following open source publication:

Wander Jager (2021). Using agent-based modelling to explore behavioural dynamics affecting our climate. Current Opinion in Psychology, 42, 133-139. ISSN 2352-250X, https://doi.org/10.1016/j.copsyc.2021.06.024. https://www.sciencedirect.com/science/article/pii/S2352250X21000968

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