Master´s Programme in Computational Social Science

Master´s Programme in Computational Social Science
120 credits

F7MCD

Valid from: 2022 Autumn semester

Determined by

Board of the Faculty of Arts and Sciences

Date determined

2017-06-01

Revised by

Course and Programme Syllabus Board at the Faculty of Arts and Sciences

Revision date

2017-11-24; 2018-10-08; 2019-06-13; 2020-12-16; 2021-06-28

Registration number

LiU-2017-02006; LiU-2019-02298; LiU-2020-00881; LiU-2021-01772

Offered first time

Autumn semester 2018

Offered for the last time

Replaced by

Introduction

The Master's Programme in Computational Social Science (CSS) is a second-cycle programme that leads to a Degree of Master of Science in Computational Social Science. During the programme, students train to apply computational methods to analyse large, complex datasets related to human social behaviour, and to arrive at theoretically and empirically grounded explanations of social outcomes such as ethnic segregation in schools, income inequality, firm growth and survival, political change and cultural diffusion. In the process, students are inducted into multidisciplinary domains of research in the social sciences that connect sociology, political science, economics, management science, and related disciplines with technical innovations in mathematics, statistics, and computer science. The programme provides:

1. grounding in the philosophy of social science research, with special attention paid to the scientific potential, practical limits, and ethical risks of growing troves of digital data describing human behaviours;
2. theoretically and empirically guided understandings of human decision making and cognitive processes, including cognitive biases, that guide choices and social interactions;
3. a framework for connecting micro-level social actions of individuals, families, firms, and other social actors, and macro-level social outcomes like segregation, inequality, cultural evolution, and industrial change;
4. formal training in key methodological components of computational social science, including traditional statistical methods, network analysis, computer simulation, agent-based modelling, web-scraping, and machine learning;
5. practical skills to implement computationally intensive social science research designs using appropriate methods;
6. a broad background in theories and empirical findings in key substantive areas of academic research in the social sciences, with connections to non-academic applications.

The programme qualifies students to engage in research and knowledge production in the academic social sciences, the private sector, and the public sector.

Aim

National Qualifications according to the Swedish Higher Education Act

Knowledge and understanding

For a Master of Science (120 credits) the student shall

• demonstrate knowledge and understanding in Computational Social Science, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and

• demonstrate specialised methodological knowledge in Computational Social Science, with special reference to critical traditions of the social sciences and the humanities.

Competence and skills

For a Master of Science (120 credits) the student shall

• demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information

• demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work

• demonstrate the ability in speech and writing both nationally and internationally to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and

• demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and approach

For a Master of Science (120 credits) the student shall

• demonstrate the ability to make assessments in Computational Social Science informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work

• demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and

• demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Content

The Master's Programme in Computational Social Science is an integrated programme of two years' full-time study. In the first two semesters students follow eight mandatory courses in philosophy of science and statistical and computational methods. In the third semester, students engage in four additional courses in which they explore applications of computational research designs to research questions emerging from theoretical traditions in substantive areas of social science research. Alternately, students have the option to study abroad during the third semester at a partner institution where they will acquire training in topics and methods related to their social scientific interests and within the programme's scope. In the fourth semester, students complete a master's thesis examining a social science research question or questions and employing a computational approach.

The heading "Curriculum" contains a list of courses included in the programme. The course syllabuses for these describe in more detail the contents, teaching and working methods, and examination.

Teaching and working methods

The programme's teaching methods align with three broad skillsets in which it provides training: theoretical understanding, practical data analytic skills, and critical evaluation. Theoretical foundations are provided in lectures, where students become versed in important social theories, contemporary social science debates, and the theoretical premises of computational and statistical techniques. Practical experience in data analysis is provided in computer laboratories. During labs, the application of techniques to real data is demonstrated by instructors, and students practice applying and extending these techniques. It is during laboratories that students learn to master commonly used software tools employed by computational social scientists.
Critical evaluation skills are developed in seminar settings. During seminars, students learn how to comprehend contemporary social research, synthesize insights from this research, and evaluate the strengths and weaknesses of particular studies or strands of social research. Students do this primarily through reading research articles and actively debating the merits of this research with fellow students. Special attention is paid to articles and texts that use computational approaches.
In addition to lectures, laboratories, and seminars, students are expected to engage in self-study. This includes reading extant social science research articles and methodological texts and completing take-home assignments designed to give students more practice in applying computational techniques.

The course syllabuses describe in more detail the contents, teaching and working methods, and examination.

Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen within one of the following subject areas:
  - humanities
  - cultural studies
  - social sciences
  - behavioural sciences
  - natural sciences
  - computer sciences
  - engineering-sciences

  or equivalent
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6)
  Exemption from Swedish

Threshold requirements

In order to get access to the third semester of the programme the student must have successfully passed at least 45 credits of the first year's courses (or equivalent)

Degree requirements

The student will be awarded the degree of Master of Science (120 credits) with a major in Computational Social Science, provided all course requirements are completed and that the student fulfils the general and specific eligibility requirements, including proof of holding a Bachelor's (kandidat) or a corresponding degree.

Completed courses will be listed in the degree certificate.

Course requirements to achieve a degree can be found in Appendix 2 to the Higher Education Ordinance (1993:100). Precise requirements for general degrees at first-cycle and second-cycle level can be found in LiU's current regulations.

A degree certificate will be issued by the faculty board on application by the student. A diploma supplement will be included as an appendix to the degree certificate.

Degree in Swedish

Filosofie masterexamen med huvudområde Computational Social Science

Degree in English

Degree of Master of Science (120 credits) with a major in Computational Social Science

Specific information

Teaching language

The teaching language is English.

Transferred credits

Decisions about transferring credit are taken by the faculty board, or by a person designated by the board, after application from the student.

Other information

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this programme syllabus, and delegate the right to take such decisions.

Curriculum

Semester 1 (Autumn 2025)

Course code	Course name	Credits	Level	Weeks	ECV
771A11	Logic of Social Inquiry	7.5	A1N	v202534-202543	C
771A15	Statistics and Data Science I	7.5	A1N	v202534-202543	C
771A13	Behavioural Mechanisms in the Social Sciences	7.5	A1N	v202544-202603	C
771A17	Statistics and Data Science II	7.5	A1N	v202544-202603	C

Semester 2 (Spring 2026)

Preliminary courses

Course code	Course name	Credits	Level	Weeks	ECV
771A19	Discrete Choice Modelling	7.5	A1N		C
771A21	Agent-Based Modelling	7.5	A1N		C
771A23	Social Network Analysis	7.5	A1N		C
771A25	Digital Strategies for Social Science Research	7.5	A1N		C

Semester 3 (Autumn 2026)

Preliminary courses

Course code	Course name	Credits	Level	Weeks	ECV
771A27	Inequality and Segregation: Theory and Measurement	7.5	A1F		C
771A33	Big Data: Social Processes and Ethical Issues	7.5	A1F		C
771A39	Computational Approaches to the Study of Organizations	7.5	A1F		C
771A43	Machine Learning for Social Science	7.5	A1N		C

Semester 4 (Spring 2027)

Preliminary courses

Course code	Course name	Credits	Level	Weeks	ECV
771A35	Master's Thesis in Computational Social Science	30	A2E		C

ECV = Elective / Compulsory /Voluntary
*Kursen läses över flera terminer