UNIVERSITY OF GOTHENBURG

FACULTY BOARD OF HUMANITIES

Logic, Master's Programme, 120 credits

Logik, masterprogram, 120 högskolepoäng

Programme code: H2LOG

Second cycle / Avancerad nivå

1. Confirmation

This programme syllabus was confirmed by the Faculty Board of Humanities on 09-09-2015 (G 2015/234) and was last revised on 06-10-2021 (GU 2021/2569) by the Dean of the Faculty to be valid from 29-08-2022, Autumn semester 2022.

Responsible Department/equivalent: Department of Philosophy, Linguistics and Theory of Science

2. Purpose

The purpose of the Master's Programme in Logic is to provide students with thorough theoretical knowledge – and the ability to apply it – within a central intellectual field, which gets its theoretical interest and practical value from a unique combination of humanities, mathematics and information science.

The main goal is that students, after successful completion of the programme, will have a coherent training and thorough understanding of the theoretical fundamentals of the subject of logic itself, its general role in the sciences and humanities, as well as its applications in fields like philosophy, linguistics, mathematics and computer science. Students will be well prepared for a career of research and development in logic and its applications, both in academia and industry.

The programme thus contains both a number of core courses, which provide a solid foundation in the fundamentals of theoretical logic and its applications, and a number of elective specializations tailored to the background, interests and career plans for individual students.

The pedagogical basis of the programme is: (i) the interdisciplinarity of the subject; (ii) the varying backgrounds of the students; (iii) a personal mentor for every student and a personalized curriculum; (iv) intense collaborative work, crossing traditional academic subject boundaries; (v) using practical exercises as a means of theoretical understanding; (vi) usage of modern, technology-supported, instruction methods, promoting student activity and fostering independent work; (vii) a pronounced and firm connection to ongoing research activities.

3. Entry requirements

Admission to the programme requires, besides fulfilling basic entry requirements, successful completion of

- at least 60 credits in total in the subject areas mathematics, logic, computer science or formal linguistics, or
- at least 90 credits in philosophy or linguistics, and additionally, or as part of the 90 credits, at least 30 credits in total in the subject areas mathematics, logic, computer science or formal linguistics,

or equivalent knowledge.

Applicants must prove their knowledge of English: English 6/English B from Swedish Upper Secondary School or an equivalent level, for example from an internationally recognized test, like TOEFL or IELTS.

Selection procedure and criteria are regulated elsewhere.

4. Higher education qualification and main field of study

This programme leads to a Degree of Master of Arts (120 credits) with a major in Logic (Filosofie masterexamen med huvudområdet Logik).

5. Outcomes

General outcomes for Degree of Master (120 credits)

Knowledge and understanding

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

- demonstrate knowledge and understanding in the main field of study, 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 the main field of study.

Competence and skills

For a Degree of Master (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 clearly report 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 Degree of Master (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study 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.

Local outcomes

Knowledge and understanding

for a Degree of Master (120 credits), the student shall

- [P1] demonstrate knowledge and understanding of the core subjects within the field of logic, their interrelations, and the relation between logic and neighbouring academic fields and current research and development,
- [P2] demonstrate advanced knowledge of central concepts, methods, questions and theories in the field of logic and its applications in philosophy, linguistics, computer science and mathematics,
- [P3] demonstrate advanced and specialised knowledge in at least one of the subareas of logic, and its applications.

Competence and skills

for a Degree of Master (120 credits), the student shall

- [P4] demonstrate the ability to discuss, analyse and evaluate results and issues in logic and its applications, based on a awareness of research traditions in the field,
- [P5] demonstrate the ability to critically, independently and creatively identify and formulate research questions, to plan and, using adequate methods, undertake advanced tasks within predetermined time frames and thus contribute to the formation of knowledge as well as the ability to evaluate this work,
- [P6] demonstrate the ability in speech and writing, both nationally and internationally, to clearly report and discuss their conclusions and the knowledge and arguments on which they are based in dialogue with different audiences,
- [P7] demonstrate the skills required to be able to apply methods from different areas of logic to new fields,
- [P8] demonstrate the skills required for participation in research and development work or independent work in some other qualified capacity,
- [P9] demonstrate ability to cooperate in multi-disciplinary groups,

Judgement and approach

for a Degree of Master (120 credits), the student shall

- [P10] demonstrate awareness of how the field of logic relates to the general development of scientific knowledge, its limitations and its role in society, and also to demonstrate awareness of ethical aspects of research and development work,
- [P11] demonstrate the ability to identify the personal need for further knowledge and take responsibility for their ongoing learning, and
- [P12] demonstrate the ability to, unrestricted by traditional academic subject boundaries, move between the different fields related to logic.

6. Content and structure

The first semester consists of three compulsory courses: *Logical theory, LOG111, 15 credits, Set theory, LOG121, 7.5 credits,* and *Modal logic, LOG131, 7.5 credits.* Furthermore, there is a seminar series for the master's students, *Colloquium in Logic*, that treats history, methodology and applications of logic. This colloquium is available throughout the programme (and is assessed during the third semester), and also functions as a meeting place for different cohorts of students. The students are furthermore encouraged to, at appropriate occasions, participate in the research seminar in logic at the department.

The second semester consists of two compulsory 7.5 credit courses: *Proof theory, LOG221* and *Philosophy of Logic, LOG250,* and two elective courses (see below). The elective courses can be individual reading courses, courses at one of the partner departments, or courses with regular teaching by teachers at the department or visiting research fellows. Elective courses are chosen in consultation with the student's individual mentor, and should fit with the student's background, plans for degree project and further career plans. For individual reading courses we take measures to coordinate the students in working groups that focus on a field jointly – to facilitate students' learning.

The third semester is organised like the second in that two compulsory courses are given in parallel with two elective ones. The compulsory 7.5 credit courses are *Model theory*, *LOG211* and the colloquium *History, Methodology and Applications of Logic, LOG310*. The two elective courses (see below) are devoted to further specialisation, but also complementary courses, all to build a personal competence profile. When choosing courses, it should be taken into account whether the student considers doctoral studies, or if they plan for a more applied line of work.

The fourth semester is devoted to the independent degree project – the 30 credit Master's Thesis. Match-making between potential supervisors, students and project proposals is done towards the end of the third semester, to enable immediate start with the thesis work the last semester.

There are no obligatory placement periods, but when appropriate work with the master thesis project can be placed at a company or with a research group outside the department. In such cases there is always a placement supervisor from the department who ensures that the work follows goals and regulations from the university.

Elective courses

The four elective courses in the second and third semesters are chosen in consultation with the student's mentor, from the following courses:

- Specialisation in Logic 1 (LOG230)
- Specialisation in Logic 2 (LOG240)
- Specialisation in Logic 3 (LOG320)
- Specialisation in Logic 4 (LOG330)

- Models of Computation (LOG260)
- Advanced Set Theory (LOG270)
- History of Logic (LOG280)
- Logic, Games and Automata (LOG290)
- Category Theory (LOG350)

Other courses – for example in computer science, linguistics, mathematics, language technology or theoretical philosophy, that by the student's individual mentor are judged to fit with the student's earlier studies and choice of specialisation – can also be chosen as elective courses.

At least one of the elective courses should prepare the student for the degree project and may well be one of the specialisation courses below.

Specialisation courses

Possible choices of content in the specialisation courses LOG230, LOG240, LOG320, LOG330 include:

- Formal theories of truth
- Computability and complexity theory
- Game theory and logic
- Philosophy of mathematics
- Knowledge representation and logic for the web
- Models of arithmetic
- Advanced modal logic

Other specialisations, decided in consultation with the student's mentor, are also possible.

7. Guaranteed admission

A student admitted to the programme, and who follows the programme at the prescribed pace of study, is subject to limited guaranteed admission. Guaranteed admission applies to all obligatory courses. During the second semester the student is guaranteed admission to two elective courses (but not necessarily the student's first choices), and equivalently for elective courses during the third semester.

8. Other information

The language of instruction is English.

Course evaluations involving students are done for every course, and are used in continuous development of the programme. Each semester there is a follow-up in cooperation with the programme coordinator and student representatives. Overall quality assurance and development of courses and the programme as a whole is discussed by all involved teachers at an annual programme conference.

The study programme will be evaluated in accordance with the Policy for Quality Assurance and Quality Improvement of Education at the University of Gothenburg (Policy för kvalitetssäkring och kvalitetsutveckling av utbildning vid Göteborgs universitet).