

Logic, Language and Computation 2014: Introductory Lecture

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[<http://www.illc.uva.nl/~ulle/teaching/lolaco/2014/>]

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Also: presentation of the Logic Tea and of Cool Logic (two seminar series for and by PhD and MoL students at the ILLC) by the seminar organisers.

The Course

Organisational Matters

- **Coordinator:** Ulle Endriss (u.endriss@uva.nl), Room F1.41
- **TA:** Thomas Brochhagen (t.s.brochhagen@uva.nl), Room F1.11
- **Timetable:** Mondays 17-19 in Room G4.15
- **Website:** Lecture slides, regulations, contact details, and other important information will be posted on the course website:

<http://www.illc.uva.nl/~ulle/teaching/lolaco/2014/>
- **Registration:** The course is obligatory for all 1st year MoL students, and open to others (let me know if you're one of them). Make sure you are properly registered.

Structure of the Course

The course has two components:

- weekly *guest lectures* by members of staff of the ILLC, for which you write short *summaries*
- research meetings that you arrange with
 - a *member of staff* to discuss one of their papers
 - a *PhD student* to discuss their thesis researchand for which you write short *research reports*

We will also be able to discuss general MoL business after some of the guest lectures if and when the need arises.

Summaries

150–200 words (the upper limit is strict; always include a word count)

Hints: Your summary should cover the most important points made by the speaker, in your own words. Given the strict word limit, you may have to make a choice as to what to include and what to leave out.

The summary should be self-contained. It should be aimed at, say, a MoL student who has not attended this particular talk. It should have a clear structure. Explain what the broader research area is; how the specific work presented fits into the broader picture; and what the main question/claim/result/etc. presented is. Do not include any kind of personal opinion. Your summary should be written in good English (in particular, typos are unacceptable). Ask a friend (who did not attend the talk) whether what you have written makes sense to them.

Grading will take into account content, style, and grammar.

Research Reports

Arrange a meeting (of up to one hour) with

- one of the members of staff offering to take part in this exercise to discuss one of their papers (see the list on the course website)
- one of the PhD students at the ILLC to discuss their research interests / thesis / life as a PhD student with them

Prepare well for these meetings:

- find out about the research area; do some background reading
- read the paper (for the staff meetings)
- think of some questions to ask and issues to discuss

After the meeting, write a short report (in your own words):

- up to 150 words summarising the paper/thesis project, and
- up to 150 words on the meeting itself

The upper limits are strict (always include a word count).

Why are we doing this?

To give you an overview of research at the ILLC:

- long-term: thesis (don't think about it too much yet!)
- short-term: individual projects, advanced courses, seminars
- and: you are here now, you might as well find out what we do

Transferable skills:

- how to get something out of a talk/paper when you did not get a systematic introduction to the topic (lecture vs. talk)
- chance to find out what it is like to do a PhD / to do research
- academic writing

Social reasons:

- to have at least one course where *all* (new) MoL students meet
- to give you an excuse to talk to (and work with) our PhD students

Re-read this when you're having a bad day . . .

While this promises to be a great course,

- there will be some topics that you won't find *that* interesting, and maybe a couple of our speakers will turn up having a bad day.

You can still practice your writing. You can still observe and learn how (not) to give a talk. You can still get something out of it.

- it can be a bit annoying when there's nothing very concrete to learn and when you don't get to see *the real stuff* in a 1h talk.

Ok. But there are enough hard courses around to make you sweat already. And you can always follow up interesting topics later on.

- you may sometimes feel that the grading of your summaries and reports is a bit arbitrary and subjective.

Of course it is. This would be impossible to do in a completely fair and systematic fashion. Please don't worry (too much) about it.

Workload

According to (our local interpretation of) the European Credit Transfer and Accumulation System (ECTS) you should work *28 hours* for *1 EC*.

Thus, for LoLaCo: *3 ECs* $\Rightarrow 3 \times 28 = 84 \text{ hours}$

I suggest that you aim for something like this:

- Lectures: $14 \times 2 \text{ hours} = 28 \text{ hours}$
- Summaries: up to $13 \times 2 \text{ hours} = 26 \text{ hours}$
- 2 research reports: $2 \times 15 \text{ hours} = 30 \text{ hours}$

This adds up to 84 hours.

Submission

Everything should be *typed* up nicely.

LaTeX is the standard tool. If you are not familiar with it yet, learn how to use it now. A helpful introduction is available here:

<http://tinyurl.com/latex-intro>

Mode of submission:

- *Summaries* should be handed in *on paper* (to Thomas).
- *Research reports* should be handed in *on paper* (to me).

Submission by email is only acceptable in truly exceptional cases (severe illness, death of a close relative, birth of a child, etc.).

Deadlines

Summaries must be handed in before the start of the next lecture.

Your *first research report* must be handed in by 3 November 2014.

Your *second research report* must be handed in by 1 December 2014.

These are hard deadlines.

Keep in mind that it takes time to arrange a meeting with your PhD student/member of staff of choice (they may be busy, travelling, ...).

They don't know about these deadlines, and they don't care.

Grading

Each piece of work will be graded as *excellent*, *good*, *pass*, or *fail*.

Your overall grade for the course will be either *pass* or *fail*.

To pass the course, you must receive (at least) a *pass* grade for

- (at least) 8 summaries and
- both research reports.

Attendance

There is no attendance list. In theory, you can pass by attending only 8 guest lectures. But this is not the point.

I want you to attend every guest lecture.

Questions

If people don't ask questions after a talk that's considered a disaster:

- It suggests that the *speaker* gave a bad talk, chose uninteresting work for presentation, and seriously misjudged the audience.
- It is deeply embarrassing for the *chair*.
- It does not exactly reflect well on the *audience* either (at best, it suggests they are unaware of the first two points ...).

So, what types of questions can you ask? Any ideas?

Examples (1)

- Clarification questions:
 - probably the most *useful* (but not the only) type of question
 - short clarifications *during* a talk are very helpful (for you, the speaker, others); save longer discussions for *after* the talk
- Digging deeper, e.g.:
 - how about this slight *reformulation* of your research question?
 - *why* did you make this choice when setting up your framework?
 - what happens if we make this *small change* to your framework?
 - why these *assumptions*? how realistic are they? would these other assumptions I just thought of work/be interesting?

Examples (2)

- Related work:
 - questions about connections to other work can be useful
 - if someone proposes a new logic / algorithm / system / approach X : why could you not have used Y ?
 - don't be too patronising about your own personal hobbies (later in life: about your own work)

Examples (3)

- Relevance of the results presented:
 - if theoretical work: what are the *applications* (if any)?
 - if application-oriented work: besides providing a practical solution, what are the most interesting *theoretical insights*?
 - a classic: what is the (computational) *complexity* of this?
 - and if someone presents a complexity result: what are the actual consequences *in practice*? (is it *really* intractable?)
 - for philosophical work: to which classical/contemporary *debate* does this contribute?
 - Maybe the speaker has given a fairly *general motivation* at the beginning and then presented a rather *specific result* (often the case for a good talk): then a fair question is to what extent the specific result actually contributes to the general objectives stated earlier. This need not be negative (e.g., it gives the speaker a chance to tell you about more such results).

Examples (4)

- Future directions:
 - if the speaker has a “*future work*” *slide* at the end, ask about any of those items: can you say a bit more? what does this point mean? how difficult do you think this will be?
 - if not: what are the next steps?
 - in your opinion, would it also be *interesting* to try X ? would it be *difficult*? has anybody *tried already*?
 - logic: axiomatisation, decidability, complexity, algorithms?
 - any formal work: can you generalise this? maybe like this?
 - experimental work: other kinds of data?
 - linguistics: other languages?
 - (almost) anything: has this been implemented? should it be?

Examples (5)

- Questions aimed at understanding the research process:
 - which of these theorems were the most difficult to prove?
which follow more or less directly from others?
 - which part of the work took the most time?
 - which part of the work (not just result) was most interesting?
 - what was the most surprising finding?
 - how did you get started thinking about this problem?
 - why did you choose this (rather than that) argumentative structure to present your result?

The ILLC

Institute for Logic, Language and Computation

- Research institute belonging to both the *Faculty of Science* and the *Faculty of Humanities* at the University of Amsterdam
- History:
 - intellectual ancestors: Brouwer, Heyting, Beth
 - informal research alliance since mid 1980s
 - officially founded in 1991
- Research (don't quote me):
 - classics: (constructivism), formal semantics, modal logic
 - added at some point: theoretical CS, computational linguistics
 - recent hot topics: cognition, logic and games
- Teaching: *Master of Logic* as well as various BSc/BA/MSc/MA programmes in AI; Computer Science; Mathematics; Philosophy; Linguistics; Cognitive Science; ...

Administrative Structure

Scientific Director: Yde Venema

Manager: Jenny Batson

ILLC Office: Karin, Gina, Peter, Tanja (MoL), Marco (webmaster)

Scientific staff: permanent/senior staff, postdocs, PhD students

Three research programmes:

- Logic and Language (LoLa)
- Language and Computation (LaCo)
- Logic and Computation (LoCo)

Logic and Language

Keywords:

- philosophical logic; semantics and pragmatics; philosophy of language; logic and cognition; metaphysics

Senior scientists:

- Maria Aloni
- Franz Berto
- Arianna Betti
- Elsbeth Brouwer
- Paul Dekker
- Raquel Fernández
- Jeroen Groenendijk (emeritus)
- Luca Incurvati
- Julian Kiverstein
- Michiel van Lambalgen
- Jaap Maat
- Floris Roelofsen
- Robert van Rooij
- Katrin Schulz
- Sonja Smets
- Martin Stokhof
- Frank Veltman (emeritus)

Language and Computation

Keywords:

- computational linguistics; statistical NLP; cognitive science; parsing; machine translation; semantics and pragmatics; music cognition; information retrieval; digital humanities

Senior scientists:

- Rens Bod
- Henkjan Honingh
- Jaap Kamps (based at *Archive and Information Studies*)
- Makiko Sadakata (based at *Musicology*)
- Marijn Koolen
- Remko Scha (emeritus)
- Khalil Sima'an
- Ivan Titov
- Henk Zeevat
- Jelle Zuidema

Logic and Computation

Keywords:

- mathematical logic; theoretical computer science; logic in AI; economics and computation; logic and cognition; modal logic; intuitionistic logic; complexity theory; quantum computing

Senior scientists:

- Krzysztof Apt (20%, rest CWI)
- Alexandru Baltag
- Johan van Benthem (emeritus)
- Benno van den Berg
- Nick Bezhanishvili
- Harry Buhrman (20%, rest CWI)
- Jan van Eijck (20%, rest CWI)
- Peter van Emde Boas (emeritus)
- Ulle Endriss
- Dick de Jongh (emeritus)
- Benedikt Löwe (50%, rest Hamburg)
- Christian Schaffner
- Jakub Szymanik
- Leen Torenvliet
- Ronald de Wolf (20%, rest CWI)
- Jouko Väänänen (10%, rest Helsinki)
- Yde Venema

Tip

Over the coming couple of months, try to read the webpages of everyone working at the ILLC.

- How have people's research interests evolved over the years?
- Identify a few people whose work you are really interested in.
- Who is / has been working with whom?
- Who is / has been whose student?
- What did people do before coming to the ILLC?
- Who has what kind of international connections?
- Where do people publish?

The Master of Logic Programme

The Master of Logic at the ILLC

Some defining features:

- Master of Logic = Master's Programme of the ILLC
- interdisciplinary vision of *Logic*; focus on formal concerns
- basic training for doing research ($\sim 75\%$ continue with a PhD)
- excellent students; high-quality programme (we try)
- international: 25–30 nationalities / ~ 85 students ($\sim 30\%$ Dutch)
- individual attention: academic mentors

History

- MoL exists since (roughly) 1995; first graduates in 1997
- initially a one-year programme (*only* international students)
- regular two-year programme since 2003, when the UvA introduced the Bachelor-Master system (following the Bologna Declaration)
- Previous MoL directors:
 - Dick de Jongh (1995–2004)
 - Benedikt Löwe (2004–2010)
- Excellent results during formal accreditation exercises

People: Staff

- Director: Ulle Endriss
- Administrator: Tanja Kassenaar
- Chair of the Board of Examiners: Benedikt Löwe
- Chair of the *opleidingscommissie* (OC): Paul Dekker
- Academic mentors:
 - Maria Aloni
 - Alexandru Baltag
 - Benno van den Berg
 - Nick Bezhanishvili
 - Ulle Endriss
 - Raquel Fernández
 - Dick de Jongh
 - Benedikt Löwe
 - Piet Rodenburg
 - Floris Roelofsen
 - Robert van Rooij
 - Christian Schaffner
 - Sonja Smets
 - Martin Stokhof

People: Students

- Student mentors:
 - Sarah Hiller
 - Frederik Lauridsen
 - Ana Lucia Vargas
 - Eileen Wagner

- MoL Room Committee/OC Students:
 - Sarah Hiller
 - Ko-Hung Kuan
 - Maša Močnik
 - Eileen Wagner
 - *vacancy*

Academic Mentors

You need your mentor

- to decide together with you which courses you should take each semester (this does *not* mean that s/he knows all the courses inside out, but s/he can still help, sometimes substantially)
- to help you find a thesis topic and supervisor
- to deal with all sorts of as-yet-unknown problems you'll face (so build up some credit during the good times!)
- to help you find a PhD position afterwards

Some mentors are proactive and will ask you for meetings at the right times. Some need you to be proactive. Meet at least once a semester.

You should have met your mentor by now.

Structure

- 120 ECs overall, over 2 years
- **Tracks:** Logic and Computation (L&C); Logic and Language (L&L); Logic and Mathematics (L&M); Logic and Philosophy (L&P)
- **Obligatory Part:** depends on track
 - *Logic, Language and Computation*
 - *Basic Logic* (if advised to take it)
 - Track-dependent obligatory courses (see next slide)
 - Research project: January/June and/or individual project
- **Free-Choice Part:** determined together with your academic mentor
 - our courses + anything else in NL (subject to mild rules)
 - might include more research projects (up to 24EC in total)
- **Thesis:** 30 ECs
- And: must attend at least 10 *seminar* sessions (no ECs)

Tracks

Purpose: get a decent background in at least one classical discipline, besides the interdisciplinary training provided by the MoL.

- **Logic and Computation (L&C)**
 - Computational Complexity (6EC)
 - Recursion Theory (6EC)
- **Logic and Language (L&L)**
 - Meaning, Reference and Modality (6EC)
 - Structures for Semantics (6EC)
- **Logic and Mathematics (L&M)**
 - Proof Theory (6EC)
 - Model Theory (6EC)
- **Logic and Philosophy (L&P)**
 - Meaning, Reference and Modality (6EC)
 - Philosophical Logic (6 EC)

Also: students with a “deficiency” in Axiomatic Set Theory (L&M) or Modal Logic (L&M and L&C) have to take those courses.

Courses

Logic, Language & Computation; Basic Logic; Modal Logic; Axiomatic Set Theory; Meaning, Reference & Modality; Structures for Semantics; Philosophical Logic; Model Theory; Proof Theory; Recursion Theory; Computational Complexity; Many-valued Logics; Mathematical Structures in Logic; Homotopy Type Theory; Seminar on Mathematical Logic; Capita Selecta Set Theory; Capita Selecta Modal Logic, Algebra, Coalgebra; Dynamic Epistemic Logic; Game Theory; Computational Social Choice; Lambda Calculus; Functional Specification of Algorithms; Information Theory; Kolmogorov Complexity; Quantum Computing; Cryptography; Concurrency Theory; Concurrent System Design by Abstraction; Autonomous Agents; Machine Learning; Natural Language Processing; Unsupervised Language Learning; Cognitive Models of Language & Music; Music Cognition; Neural and Cognitive Modelling; Logical Methods in Cognitive Science; Rationality, Cognition & Reasoning; Computational Semantics & Pragmatics; Bayesian Semantics & Pragmatics; Logic & Conversation; The Semantics of Belief; Philosophy of Language; Wittgenstein; Kant, Logic & Cognition; Transcendental Logic, Space and Time; Neurophilosophy of Free Will; Neurophilosophy of Self; The Computational Mind and its Critics; Logic, Knowledge & Science; Philosophy of Science. And more.

Projects

There are two types of projects:

- January/June Projects:
 - Each January and each June, we offer a small number of project courses (6EC, one month of fulltime work).
 - The list of projects changes each year and will get published a few weeks in advance of the project period.
- Individual Projects:
 - You can do a project on any topic at any time *if you find a supervisor*. This is very flexible, but requires your initiative.
 - Potential supervisors are ILLC senior staff, postdocs, PhD students, and visitors.
 - Hint: Find out about people's interests (seminars, homepages); don't just confront them with a fully specified project proposal.

Seminars

Before you are allowed to start work on your MoL thesis you *must* attend at least 10 seminar talks. Of course, you *want* to attend many more than that:

- contact with cutting-edge research
- ideas for your thesis

Regular seminars include:

- Logic Tea
- Cool Logic
- DIP Colloquium
- Computational Linguistics Seminar
- Colloquium on Mathematical Logic
- Computational Social Choice Seminar
- Seminar on Logic and Interactive Rationality
- SMART Cognitive Science Lectures
- ILLC Colloquium (twice a year)
- and there's more: regular or one-off, advertised or by word of mouth
- also very interesting: PhD and MoL defenses

The Academic Year

- Semester 1: September to January
 - Block 1a (8 weeks): regular courses
 - Block 1b (8 weeks): regular courses
 - Block 1c (4 weeks): project period
- Semester 2: February to June
 - Block 2a (8 weeks): regular courses
 - Block 2b (*8 weeks): regular courses
 - Block 2c (4 weeks): project period

The final week of each 8-week block is usually reserved for exams.

Aim for 12–15EC per 8-week block (certainly not more than 18EC).

Registration

Registration for *courses* works via SIS (that's the idea, anyway).

In your first semester, use the online form provided for Science courses and email for Humanities courses (deadline: *12 September 2014*).

If you didn't manage to register for a course when it starts, make sure the lecturer knows you intend to take the course (send an email).

Find out about deadlines and respect them as much as possible. It is not always possible, and we know this. In that case, ask for help.

Registration for *projects* is directly with the lecturer/supervisor.

See also: [MoL Website](#) / [Current Students](#) / [Courses](#) / [Registration](#)

Modes of Examination

Examination in the MoL can take a variety of forms, including:

- homework (or take-home exams)
- papers
- presentations
- less common: written exams
- very rare: oral exams

Not having to rely too much on written exams is nice, because you probably learn more and it's more interesting for all of us.

Fortunately, we tend to have very few problems with excessive levels of *collaboration* (or outright *plagiarism*).

Basic rule: discussing with others to improve your understanding is fine (indeed, it is encouraged); producing your solution is something you do by yourself [individual lecturers may impose more specific rules]

Things that didn't fit elsewhere

Admin stuff:

- *Lectures* start on the hour (and end at a 15 minutes to the hour).
- 1 **EC** = 28 hours of work. In theory.
- *Office hours*: we don't have any, but that does not mean that you cannot talk to us. On the contrary.

Tips:

- Attend a few MoL *thesis defenses* when you get the chance.
- Make use of the *MoL Room!* (a unique feature of this programme)

Finally:

- Tell me, Tanja, your academic mentor, your student mentor, or a member of the OC when there's a *problem*.

Websites

The most important website you need to know about:

<http://www.illc.uva.nl/MScLogic/>

- ▶ Read about *facilities*, the *graduation* procedure, *careers*, ...
- ▶ Go to “Courses” to find links to some other important websites:
 - the *course descriptions* listed in the *studiegids*
 - the *timetables*

Last word: try to be on time for classes (obviously); for this course this is absolutely crucial, given that we have a different *guest* every week.