

Logic, Language and Computation 2010: Introductory Lecture

Ulle Endriess
Institute for Logic, Language and Computation
University of Amsterdam

[<http://www.llc.uva.nl/~ulle/teaching/10laco/2010/>]

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Also: presentation of the Logic Tea (seminar series for and by PHD and MOL students at the LLC) by the Logic Tea organisers.

Organisational Matters

- **Coordinator:** Ulle Endriess (u.endriess@uva.nl), Room C3.140
- **TA:** Inés Crespo (inescrespo@uva.nl), Rooms 2.11 & C3.136
- **Timetable:** Mondays 17-19 in Room A1.04
- **Website:** Lecture slides, regulations, contact details, and other important information will be posted on the course website: <http://www.llc.uva.nl/~ulle/teaching/10laco/2010/>
- **Registration:** The course is obligatory for all 1st year MOL students, and open to others (let me know if you're one of them). You have to register via *stufieleweb*.

Structure of the Course

The course has two components:

- weekly *guest lectures* by members of staff of the LLC, 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 research
 and 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.

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 LLC to discuss their thesis research 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).

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 opinions. 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 both content and style into account.

Why are we doing this?

To give you an overview of research at the LLC:

- 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.*

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/1atex-1ttto>

Mode of submission:

- *Summaries* should be handed in *on paper* (to Inés). Submission by email is only possible in truly exceptional cases (severe illness, death of a close relative, birth of a child, etc.).
- *Research reports* should be handed in as *PDF attachments* by email (sent to me).

Grading

Each piece of work is graded on the standard Dutch scale from 1 to 10.

Your overall grade for the course will be computed as follows:

$$\begin{aligned} & \text{sum of your 8 best summary grades} + \\ & 2 \times \text{grade of your first research report} + \\ & 2 \times \text{grade of your second research report} \\ & \text{divided by 12} \end{aligned}$$

Rounding (up or down) is at the discretion of your lecturer.

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?*

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: $3\text{ ECs} \Rightarrow 3 \times 28 = 84\text{ hours}$

I suggest that you aim for something like this:

- Lectures: $14 \times 2\text{ hours} = 28\text{ hours}$ (less, actually)
- 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.

Deadlines

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

Your *first research report* must be handed in by 8 November 2010.

Your *second research report* must be handed in by 13 December 2010.

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.

Attendance

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

I want you to attend every guest lecture.

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?
- experimental work: why these assumptions? how realistic are they? would these other assumptions work/be interesting?
- philosophical work: similar questions about assumptions

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 (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?

The ILLC

Administrative Structure

Scientific Director: Leen Torenvliet
 Manager: Ingrid van Loon

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

Scientific staff: permanent staff, postdocs, lecturers, PhD students

Three research programmes:

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

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?)
 - if 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 (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?
 - why did you choose this (rather than that) argumentative structure to present your result?

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; . . .

Logic and Language

Keywords:

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

Senior scientists:

- | | |
|-------------------------|--------------------|
| • Maria Aloni | • Robert van Rooij |
| • Paul Dekker | • Katrin Schulz |
| • Jeroen Groenendijk | • Martin Stokhof |
| • Theo Janssen | • Frank Veltman |
| • Michiel van Lambalgen | |

Language and Computation

Keywords:

- computational linguistics: statistical NLP, cognitive science; parsing; machine translation; semantics and pragmatics; optimality theory, music cognition; information retrieval

Senior scientists:

- Reinhard Bluthr
- Rens Bod
- Henkjan Honnigh
- Jaap Kamps (based at *Archives and Information Studies*)
- Renko Scha (emeritus)
- Khalil Sima an
- Henk Zeevat (on sabbatical in 2010-2011)

Tip

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

- 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 LLC?
- Who has what kind of international connections?
- Where do people publish?

The Master of Logic at the LLC

Some defining features:

- Master of Logic = Master's Programme of the LLC
- interdisciplinary vision of *Logic*: focus on formal concerns
- basic training for doing research (~75% continue with a PhD)
- excellent students: high-quality programme (we try)
- international: 25–30 nationalities / ~70 students (~30% Dutch)
- individual attention: academic mentors

People: Staff

- Director: Ulle Endriss (until recently; Benedikt Löwe)
- Administrator: Tanja Kassenaar
- Chair of the Board of Examiners: Frank Veltman
- Chair of the *opleidingscommissie* (OC): Yde Venema
- Academic mentors:
 - Maria Aloni
 - Rens Bod
 - Ulle Endriss
 - Dick de Jongh
 - Alessandra Palmigiano
 - Piet Rodenburg
 - Martin Stokhof

Logic and Computation

Keywords:

- mathematical logic; theoretical computer science; logic in AI; game theory; computational social choice; coalgebra; modal logic; intuitionistic logic; set theory; model theory; complexity theory

Senior scientists:

- Krzysztof Apt (20%, rest at CWI)
- Leen Torenvliet
- Johan van Benthem
- Anne Troelstra (emeritus)
- Harry Buhrman (20%, rest at CWI)
- Jouko Väänänen
- Peter van Emde Boas (emeritus) (10%, rest in Helsinki)
- Ulle Endriss
- Yde Venema
- Dick de Jongh (emeritus)
- Paul Vitányi (emer./CWI)
- Benedikt Löwe (on sabbatical until February 2011)
- Alessandra Palmigiano

The Master of Logic Programme

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)
- MoL rumoured to have achieved the best results across all Master's programmes (in any discipline) in the Netherlands in the NVAO Accreditation Exercise in 2007

People: Students

- Student mentors:
 - Marta Sznajder
 - Gabriela Asil Rino Nesin
 - Bruno Jacinto
 - Johannes Marti
- MoL Room Committee/OC Students:
 - Irma Cornelisse
 - Annemieke Reijngoud
 - César Sainz de Vicuña
 - *two vacances*

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.

Tracks

Purpose: get a decent background in at least one classical discipline, besides the interdisciplinary training provided by the MoL (but not that important).

- **Logic and Computation (L&C)**
 - Introduction to Logic in Computer Science (6EC)
 - Recursion Theory (9EC)
- **Logic and Language (L&L)**
 - Meaning, Reference and Modality (10EC)
 - Structures for Semantics (10EC)
- **Logic and Mathematics (L&M)**
 - Model Theory (6EC) + L&C courses
 - **Logic and Philosophy (L&P)**
 - Meaning, Reference and Modality (10EC)
 - Kant, Logic and Cognition (10 EC)
 - Philosophical Logic (6 EC)

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

Important Courses in the 1st Semester

Obligatory (depending on track):

- Logic, Language and Computation
- Basic Logic (if advised to take it)
- Meaning, Reference and Modality (L&L and L&P)
- Logic in Computer Science (L&C and L&M)
- Model Theory (L&M)

Other central courses (on which others build directly or indirectly):

- Modal Logic
- Computational Complexity
- Elements of Language Processing and Learning

Projects

There are two types of projects:

- **January/June Projects:**
 - Each January and each June, we offer a small number of project courses (6 EC, 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.

Structure

- 120 ECTS 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
- **Thesis:** 30 ECTS
- And: must attend at least **10 seminar** sessions (no ECTS)

Courses

Logic, Language and Computation; Basic Logic; Modal Logic; Axiomatic Set Theory; Meaning, Reference and Modality; Structures for Semantics; Kant, Logic and Cognition; Philosophical Logic; Logic in Computer Science; Recursion Theory; Model Theory; Proof Theory; Set Theory; Mathematical Structures in Logic; Intuitionistic Logic; Seminar on Mathematical Logic; Computational Complexity; Lambda Calculus; Concurrency Theory; Theory and Application of Multi-Threading; Reasoning with Uncertainty; Neural Nets and Symbolic Reasoning; Knowledge Representation; Qualitative Reasoning; Information Retrieval; Machine Learning; Cognitive Models of Language and Beyond; Unsupervised Language Learning; Elements of Language Processing and Learning; Statistical Structure in Language Processing; Mechanisms of Meaning; Language and Optimality; Semantics and Pragmatics; Philosophy of Semantics; Philosophy of Language; Radical Interpretation; Rationality, Cognition and Reasoning; Philosophy and Cognition; Strategic Games; Cooperative Games; Computational Social Choice; Games and Complexity; Formal Logic before Frege; Traditional Logic Extended; Fallacies; Music Cognition; And more.

Important Courses in the 2nd Semester

Obligatory (depending on track):

- Structures for Semantics (L&L)
- Philosophical Logic (L&P)
- Kant, Logic and Cognition (L&P)
- Recursion Theory (L&C and L&M)

Other central courses (on which others build directly or indirectly):

- Strategic Games

Seminars

Before you can defend 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
- DIP Colloquium
- Computational Linguistics Seminar
- Colloquium on Mathematical Logic
- Computational Social Choice Seminar
- Seminar on Logic and Interactive Rationality
- and there's more: regular or one-off, advertised on ILLC newsletter/web or by word of mouth

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.

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]

Websites

The most important website you need to know about:

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

- ▶ Read about *facilities*, the *graduation* procedure, ...
- ▶ Click on "Courses" to find links to some other important websites:
 - the *course descriptions* listed in the *studiegids*
 - the *timetables*
 - *studieweb* to register for courses (and more)

Registration

Registration for *courses* works via *studieweb*:

<http://studieweb.student.uva.nl>

Find out about the various deadlines and respect them as much as possible. It is not always possible, and we know this. In that case, arrange registration with the lecturer directly.

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

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:
 - The standard "Science" course has 6 ECs.
 - The standard "Humanities" course has 10 ECs.

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*.