Plan for the seminar, agreed on in a meeting on the 27th of June, 2007 (present KA, AB, UB, JEB, FGM, AGS (and MR on the phone)).

**Students**
Peter Berry, Jin Cao, Karim Kanso, Ebrahim Larijani, Mark New? (PhD/MPhil students might participate as well, but will not be assessed and will not necessarily give talks).

**Time**
20 contact hours = 10 sessions.
One session per week. 1 session = 2 × 45 minutes = 2 contact hours.

**Talks**
λ-calculus (sessions 1-4)

- Introductory talks by UB following Barendregt’s Handbook article [B] (2 sessions).
  - 2 student talks (1 session each).

Temporal logic (sessions 5-9)

- Introductory talk by FMG following Stirling’s book [S] (2 sessions)
  - 3 student talks (1 session each).

1 remaining ‘buffer’ session. Originally it was planned to interleave the introductory talks, but in the meeting a majority favoured a blockwise arrangement.

**Topic selection**
Students should be informed about possible topics a.s.a.p. in order to allow for enough time for preparation. Arnold and I will inform Ebrahim Larijani and Peter Berry now. Peter Berry is likely to choose the λ-calculus, so he could give the first student talk. The choice of the seminar topic is independent of the project topic (the latter is to be determined within the first month of the semester, i.e. by the end of October).

**Supervision**
Each student is assigned a seminar supervisor (big brother) (who need not be the project supervisor). The supervisor has to make sure that the student has a detailed and sound plan one week before the talk.

p.t.o.
Deliverables/Assessment

- Talk (blackboard or slides) + handout 30%
- Abstracts of all other talks (to be delivered immediately after each talk) 30%
- Report (to be delivered sometime after the talk) 40%

The idea of the abstracts is that students should summarize the talk they just heard in a few words (from memory). A form will be provided. The form will also contain a slot where students can assess the talk. The deliverables are evaluated at the end of the seminar.

Course material

\(\lambda\)-calculus


Talks

1. Strong undecidability of the \(\lambda\)-calculus (detailed presentation of diagonalisation argument) (using Turing completeness, which is sketched in the introductory lectures). Notions of reduction ([B], 2.2.13 - 2.3.6). Parallel reduction, proof of Church-Rosser Theorem via diamond property for parallel reduction ([T], 1st half of Chapter 1). A good student might present more of that paper.

2. Strong normalisation for the simply typed \(\lambda\)-calculus using computability predicates ([B], 4.3 up to 4.3.6). The rest of 4.3 (SN for \(\lambda\)2) is optional.

3. (optional) Intersection types. Equivalence of strong normalisation and typability in the intersection type system [G, all]. One direction is a straightforward extension of the result in the 3rd talk. The other direction uses induction on the “SN-measure” of a term.

Temporal logic

- [GTW] Grädel, Thomas and Wilke: Automata, Logics and Infinite Games (An LNCS Volume of tutorials on a variety of topics, such as ”Determinization of Buchi Automata” by M Roggenbach.)
- [PRV] Ponse, de Rijke and Venema: Modal Logic and Process Algebra (A CSLI Volume of tutorials, such as a delightful game-theoretic proof of Kamp’s Theorem by Hodkinson.)
- [MB] Moller and Birtwistle: Logics for Concurrency: Automata v Structure (An LNCS Volume of tutorials, including Emerson on branching-time logics and Vardi on linear-time logics.)

If I understood Faron correctly, [S] will be the basis for the introductory talks. The other sources might be used for student talks.

The \(\lambda\)-calculus papers and this memo are available at

http://www.cs.swan.ac.uk/~csulrich/mres-seminar.html