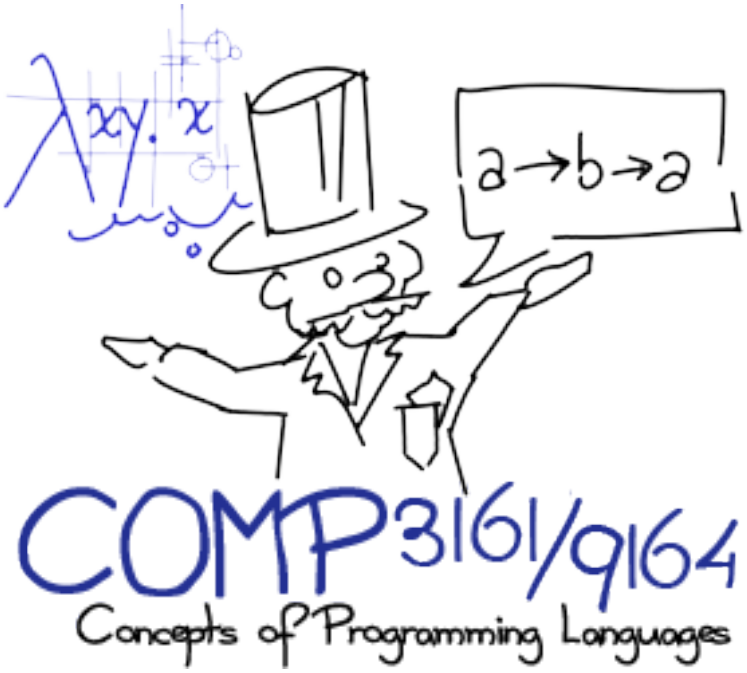


Revision Lecture

Thomas Sewell and Rob Sison
UNSW
Term 3 2025

That's it

As of Tuesday, we have now covered all the content in COMP3161/COMP9164. Thanks for sticking with the course.

- **Syntax Foundations**
  Concrete/Abstract Syntax, Ambiguity, HOAS, Binding, Variables, Substitution, λ-calculus
- **Semantics Foundations**
  Static Semantics, Dynamic Semantics (Small-Step/Big-Step), Abstract Machines, Environments, Stacks, Safety, Liveness, Type Safety (Progress and Preservation)
- **Features**
  - Algebraic (Sum/Product) Data Types, Recursive Types
  - Errors, Exceptions
  - Polymorphism (Universal Types), Type Inference, Unification
  - Abstract (and Existential) Data Types, Overloading, Subtyping
  - Concurrency, Session Types

MyExperience

Please fill out the survey. It helps tremendously.

`https://myexperience.unsw.edu.au`

Further Learning

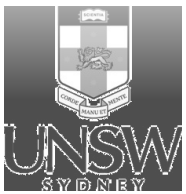
- UNSW courses:
  - COMP3131 — Programming Languages and Compilers
  - COMP3153 — Algorithmic Verification
  - COMP4141 — Theory of Computation
  - COMP4161 — Advanced Topics in Software Verification
- Online Learning
  - Oregon Programming Languages Summer School Lectures (https://www.cs.uoregon.edu/research/summerschool/archives.html) Videos are available from here! Also some on YouTube.

What's next?

The exam is on **Monday, 8th of December 2025**, in the morning session (9:50am-12:00pm).

- The exam is in person at UNSW. Leave plenty of time to be seated for 9:50am.
- The exam is 2 hours (plus 10 minutes "reading time").
- We have uploaded two sample exams from 2011 and 2014.
  (Note: Ignore sample questions on "most general unifiers" and STM.)
- The final exam will run similar to the sample exams.
- You may bring in one (A4, double sided) page of notes.
- The exam uses the ExamScan mechanism.
  - Write your answers on the exam book using a black pen.
  - Don't write on QR codes.

Exam First Page



School of Computer Science and Engineering

COMP3161/9164
– Concepts of Programming Languages

Final Exam

Instructions:

1. TIME ALLOWED – 2 hours

2. READING TIME – 10 minutes

3. THIS EXAMINATION PAPER HAS 13 PAGES

4. TOTAL NUMBER OF QUESTIONS – 19

5. TOTAL MARKS AVAILABLE – 100

6. MARKS AVAILABLE FOR EACH QUESTION ARE SHOWN IN THE EXAMINATION PAPER

7. ALL ANSWERS MUST BE WRITTEN IN INK. EXCEPT WHERE THEY ARE EXPRESSLY REQUIRED, PENCILS MAY BE USED ONLY FOR DRAWING, SKETCHING OR GRAPHICAL WORK

8. THIS PAPER MAY NOT BE RETAINED BY CANDIDATE

9. CANDIDATES MAY BRING TO THE EXAMINATION: 1 double-sided A4 sheet of notes

10. THE FOLLOWING MATERIALS WILL BE PROVIDED: One exam workbook for drafts and working

TS Research Projects

Thomas & Rob work for/with CSE's Trustworthy Systems group.

For more info on our group: `https://trustworthy.systems`

TS Research Projects

We're open to supervising honours and postgraduate research projects/theses on seL4-related software verification topics.

- **Pancake language**: implement and verify compiler improvements
- **Microkit**: library code verification using deductive verification tools
- **component subpolicies**: verify userland code satisfies local security policies using deductive verification tools
- **time-protection extensions**: verify seL4 prevents data leakage between users via timing channels using interactive theorem proving

A background in OS or other theory/verification courses also helps.

If any of this sounds interesting to you, get in touch!

Your Requests and Sample Exams

We can now go through any questions you have, including from the sample exams.