

# AAA616: Program Analysis

## Lecture 0 — Course Overview

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# Basic Information

Instructor: Hakjoo Oh

- **Position:** Assistant professor in Computer Science and Engineering, Korea University
- **Expertise:** Programming Languages and Compilers
- **Office:** 616c, Science Library
- **Email:** `hakjoo_oh@korea.ac.kr`
- **Office Hours:** 1:00pm–3:00pm Mondays and Wednesdays (by appointment)

Course Website:

- <http://pr1.korea.ac.kr/~pronto/home/courses/aaa616/2016/>
- Course materials will be available here.



# Static Program Analysis

- Technology for “Software MRI”



- Predict SW behavior statically and automatically
  - ▶ **static**: before execution, before sell / embed
  - ▶ **automatic**: sw is analyzed by sw (“static analyzer”)
- Applications
  - ▶ **bug-finding**: e.g., find runtime failures of programs
  - ▶ **security**: e.g., is this app malicious or benign?
  - ▶ **verification**: e.g., does the program meet its specification?
  - ▶ **compiler optimization**: e.g., automatic parallelization

# Topics

## • **Foundational Theories**

- ▶ Programming language theory: semantic formalism, operational semantics, denotational semantics
- ▶ Abstract Interpretation theory: Galois-connection, abstract domain, abstract semantics, fixed points, widening, narrowing
- ▶ lecture-based

## • **Modern Static Analysis Techniques**

- ▶ interprocedural analysis, context-sensitivity, sparse analysis, selective analysis, pointer analysis, relational analysis, shape analysis, etc
- ▶ discussion-based

# Course Materials and Grading

## Course materials:

- Semantics with Applications (Second Edition) by Hanne Riis Nielson and Flemming Nielson. Springer.
- Principles of Program Analysis by Flemming Nielson, Hanne Riis Nielson, and Chris Hankin. Springer.
- Self-contained slides will be provided.

## Grading:

- Homework / Quiz – 70%
  - ▶ 5–8
- Paper presentation – 30%