Static Program Analysis

Class codes:
- **DCC831** - Graduate program in computer science
- **DCC030** - Undergraduate program in computer science
- **DCC049** - Undergraduate program in information systems

Name of class: Static Program Analysis - (**Course given in English**)
Professor: Fernando Magno Quintão Pereira
Audience: grad/undergrad students
Syllabus: Program representations; Code optimizations; The data-flow monotone framework; constraint-based analyses; Alias and points-to analysis; Lattice theory; Abstract interpretation; Register allocation algorithms; Static single assignment form; Sparse data-flow analyses; Static analyses for GPUs; Dynamic analysis in JIT compilers; Automatic theorem verification; Type systems and type inference; The LLVM compilation infrastructure.

Class	Date	Subject	Format
1	Mar 8	Introduction	Classroom
2	Mar 13	Control flow graphs	Classroom
3	Mar 15	Dataflow analyses	Classroom
4	Mar 20	Algorithms to solve dataflow analyses	Classroom
5	Mar 22	Lattice theory	Classroom
6	Mar 27	Partial redundancy elimination	Classroom
7	Apr 03	Constraint based analysis	Classroom
8	Apr 05	Pointer analysis	Classroom
9	Apr 10	Loop optimizations	Classroom
10	Apr 12	Static single assignment form	Classroom
11	Apr 17	Sparse abstract interpretation	Classroom
12	Apr 19	Tainted flow analysis	Classroom
13	Apr 24	Paper discussion	Classroom
14	Apr 26	Review class	Classroom
15	May 03	Midterm exam	Remote

Class	Date	Subject	Format
13	May 08	Range analysis	Classroom
17	May 10	Program slicing	Classroom
18	May 15	Predictive Compilation	Classroom
19	May 17	Operational semantics	Classroom
20	May 22	Type systems	Classroom
21	May 24	Mechanical validation of theorems with Twelf	Classroom
22	May 29	Type inference	Classroom
23	May 31	Just-in-time compilers	Classroom
24	Jun 05	Register allocation	Classroom
25	Jun 07	SSA-based register allocation	Classroom
26	Jun 12	Correctness	Classroom
27	Jun 14	Divergence analysis	Classroom
28	Jun 19	Paper discussion	Classroom
29	Jun 21	Review class	Classroom
30	Jun 26	Final exam	Remote

Supporting material: https://homepages.dcc.ufmg.br/~fernando/classes/dcc888
Bibliography: Principles of Program Analysis, Nielsen & Nielsen. For more related books, see:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/biblio.html
Evaluation: Two take-home exams worth 20 points each. For examples, see:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/grading.html.
Project assignment:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/assignment/.
Homeworks: 24 exercises, available at:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/ementa/.
Online classes: videos on YouTube, with links available at:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/ementa/.
Paper discussion: two sessions of paper discussion. For more info, see:
https://homepages.dcc.ufmg.br/~fernando/classes/dcc888/discussion.html.