COP 6556 – Formal Semantics of Programming Languages, Spring 2011

T & Th 11:00 – 12:15 pm, ECS 235

Dr. Xudong He
ECS 212(B), Tel. 348-1831, Email. Hex@cs.fiu.edu
Office Hours: T & Th 1:00 – 2:00 pm & 3:30 – 4:30pm

Overview

COP 6556 is a graduate-level course on formal semantics of programming languages. Students will learn the fundamental concepts and approaches in defining the formal semantics of programming languages. These formal approaches lay the foundation for understanding, designing, and implementing new programming languages, and for ensuring program correctness.

Prerequisites

Students need to know discrete mathematics such as set, functions, and logic. Knowledge of abstract computational models (covered in COT 5420) will be very helpful. Knowledge of some high-level programming languages is also useful.

Text

The textbook is *The Formal Semantics of Programming Languages – An Introduction* by Glynn Winskel, The MIT Press 1993. Useful reference books include *Semantics of Sequential and Parallel Programs* by Eike Best, Prentice-Hall International, 1996. Various supplemental materials will be used in the course.

Homework

There will be 5 homework assignments. Homework will be assigned every 2 weeks. Each homework assignment should be turned in at the end of class on the due date. Late homework turned in before the next lecture will receive partial credit. Homework assignments need to be typed.

Exams

There are two exams on Feb. 17 and April 22, respectively.

Grading

Homework (50%) + Exams (50%)

Tentative Schedule

Week 1 – Basic Mathematical Concepts: Logic, Sets, Functions, Relations, Partially Ordered Sets
Week 2 – Semantics of Sequential Programs – Operational Semantics
Week 3 – Principles of Induction and Inductive Definitions
Week 4 – Semantics of Sequential Programs – Denotational Semantics
Week 5 – Semantics of Sequential Programs – Axiomatic Semantics
Week 6 – Completeness of the Hoare Rules
Week 7 – Introduction to Domain Theory
Week 8 – Recursion Equations
Week 9 – Techniques for Recursion
Week 10 & 11 – Languages with Higher Types
Week 12 & 13 – Recursive Types
Week 14 & 15 – Nondeterminism and Parallelism