# THE OHIO STATE UNIVERSITY
## COLLEGE OF ENGINEERING

# Foundations of Programming Languages

## CSE 6341

**Credit Hours:**
3.00 - 3.00

**Course Levels:**
Graduate (5000-8000 level)

**Course Components:**
Lecture

**Course Description:**
Conceptual foundations of programming languages: attribute grammars; types; functional languages; language semantics; abstract interpretation.

**Prerequisites and Co-requisites:**
Prereq: 3341 (655) or 5341.

**Course Goals / Objectives:**
- Master using attribute grammars to specify context-sensitive conditions related to standard imperative language constructs
- Master using attribute grammars to specify code generation for standard imperative language constructs
- Be competent with principles of functional languages and techniques for their implementations
- Be competent with analyzing types in functional, imperative, and object-oriented languages
- Be competent with analyzing the formal semantics of imperative languages
- Be familiar with abstract interpretation and its application to derive approximate semantics of programs

**Course Topics:**
- Attribute grammars; using AGs to define context-sensitive syntax of languages;
- Using AGs to define translational semantics of imperative languages;
- Functional languages: typed and untyped (Lambda calculus, Lisp, ...); implementations of functional languages including memory management; meta-circular interpreters;
- Types in programming languages: Type systems, type checking, type inference/ reconstruction, recursive types, subtypes, higher-order types; dynamically typed languages; implementation issues;
- Formal semantics of programming languages: structured operational semantics; denotational semantics; abstract interpretation and static analysis;
- Exams, review;

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**Designation:**
Elective