# CSI 3350: Programming Languages **– Winter 2018**

**Instructor:** Lunjin Lu <L2LU@oakland.edu>
Lecture hours: 3:30 – 5:17 PM on MW @ EC 279
Office hours: 2:30 – 3:15 PM on Wednesdays @ EC 546
**Teaching Assistant:** Assad Maalouf <amaalouf@oakland.edu>
Office Hours: 1:30 -3:15 PM on Mondays, 118 DHE

# Course Description:

Fundamental concepts in programming languages. Several high-level languages are studied in depth and their approaches to the fundamental issues in language design are compared. Issues include: data types and structures, control structures, binding times, run-time, storage organization, flexibility vs. efficiency, compiled vs. interpreted languages, strong vs. weak typing, block structure and scope of names.

**Prerequisites:** CSE 231, MTH 256 and Major standing.

# Course Objectives:

This is a required professional course for all computer science students. Its primary goal is to address principles behind high level programming languages and different programming paradigms. By the end of this course the successful student will be able to:

1. Describe main quality criteria for high level programming languages such as readability, writability, reliability and cost. [ABET CS: (b)]
2. Describe syntax of fundamental program components. [ABET CS: (i)]
3. Discuss fundamental concepts of operational semantics. [ABET CS: (a, i)]
4. Describe activation records, parameter passing and access to non-locals. [ABET CS: (i)]
5. Describe data types and type systems. [ABET CS: (i)]
6. Explain and apply major features of functional and logic programming languages. [ABET CS: (a, i)]

# Text and reference books:

1. ***Modern Programming Languages: A Practical Introduction***, Adams Brooks Webber, Franklin, Beedle & Associates, Inc., 2/e, 2011.
2. ***Programming Language Pragmatics,*** Michael L. Scott, Elsevier, 3/e, 2009.
3. ***Programming Languages: Principles and paradigms***. Allen B. Tucker and Robert E. Noonan, McGraw-Hill, 2/e, 2007

# Assessment:

- Two exams and a number of in-class exercises will be given. In-class exercises are not announced.
- Homework assignments will be made throughout the semester. Completed assignments must be submitted through the Moodle system.
- The Course Grade is based (curved) on the weighted sum of points earned.
  - Exams 50%
  - Homework 30%
  - Collected In-Class Exercises 15%

- Class participation 5%

# Attendance:

Attendance is expected. You must sit in examinations. ***There will be no make-up for homework assignments, in-class exercises or exams.***

# Tentative Schedule

| Dates | Topics | Reading |
|---|---|---|
| **January 3, 8, 10** | **Introduction and definition, Language Criteria, Categories, Related areas & Implementation** | **Scott/1** |
| **17, 22, 24, 29, 31** | **Syntax: CFG, Regular Expressions, Flex and Bison** | **Webber/2,3; Scott 2; Tucker 2-3** |
| **February 5, 7, 12, 14, 26** | **Functional Programming** | **Webber 5,7,9,11; Scott 10; Tucker 14** |
| **28** | **Review** | |
| **March 5** | **Mid-term** | |
| **7, 12** | **Bindings** | **Webber 4, Scott 3** |
| **14,19** | **Data types and Scopes** | **Webber 6, 10; Scott 3,7; Tucker 6, 7** |
| **21, 26** | **Logic Programming** | **Webber/19, 20,22; Scott/11; Tucker 15;** |
| **28, April 2** | **Sub-Programs** | **Webber 12,18; Scott 8; Tucker 9** |
| **4, 9, 11** | **Formal Semantics** | **Webber/23; Tucker 7, 8; Scott 4** |
| **16** | **Review** | |
| **April 25** | ***3:30 – 6:30 PM @ EC 279*** | |

## Behavioral Contract: (During lectures and class work)

- **Students will be asked to leave the classroom if they do not follow this contract:**
  - **Digital devices such as: cell phones, tablets, ipod, mp3 players... etc need to be placed out of sight and must be set to silent, (I will keep my cell phone avail. For emergency preparedness)**
  - **No head phones are allowed.**
  - **Students are expected to work on CSI 3350 class material only during class time. Surfing the net for Social sites and being on Social Media are not allowed during lecture hours.**
- **Class participation is part of your grade make sure to participate in our class practices.**

**Home Assignments: There will be several home assignments given, assignments typically will have a due date of 7-10 days. All assignments will be posted on Moodle. Be prepared to answer**

**questions about your assignment work, there will be home assignments picked randomly by your teaching assistant and instructor.**

**In Class Activities: There will be periodic in class activities. All in class activities (ICATS) are designed for practicing your Programming Languages concepts. Students are allowed to use their notes and books. Students must be present in class in order to earn any credit for any ICAT. Some ICATS are collected and graded.**

## Academic Conduct: Expected conduct on assignments and exams

**Although students may discuss an assignment, each student should complete his or her assignment individually. Copying of another's assignment is not permitted. It is assumed that ALL work throughout the term is your own. Discussions during an exam or quiz are not permitted. Cheating during an exam or quiz is not permitted. It is assumed that ALL WORK THROUGHOUT THE TERM IS YOUR OWN! Discussion of assignments are permitted but copying of assignments is not! Handing in an assignment or exam that was essentially copied from someone else does constitute as cheating. All of the tests are closed book unless it was told otherwise. Obtaining help from notes, another individual or from hand held computing devices during an exam is regarded as cheating. The Oakland University Academic Conduct Policy can be found at http://www4.oakland.edu/?id=1610&sid=75. Cheating on examinations, plagiarism, falsifying reports/records, and unauthorized collaboration, access, or modifying of computer programs are considered serious breaches of academic conduct. The Oakland University policy on academic conduct will be strictly followed with no exceptions. See catalog under Academic Policies and Procedure.**

## Program Outcomes

a) An ability to apply knowledge of computing and mathematics appropriate to the discipline;

b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;

c) An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;

d) An ability to function effectively on teams to accomplish a common goal;

e) An understanding of professional, ethical, legal, security, and social issues and responsibilities;

f) An ability to communicate effectively with a range of audiences;

g) An ability to analyze the local and global impact of computing on individuals, organizations and society;

h) Recognition of the need for, and an ability to engage in, continuing professional development;

i) An ability to use current techniques, skills, and tools necessary for computing practice;

j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;

k) An ability to apply design and development principles in the construction of software systems of varying complexity