cs310: Programming Languages

by Tim Menzies

LCSEE, WVU, Spring 2011

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1 Syllabus

- Course name: CS310, Principles of Programming Languages
- Effective data of syllabus: Jan 11, 2011
- Site: LCSEE, WVU
- Course number: 10961
- Pre-requisite: successful completion of CS 111, Data Structures
- Course format: 3 credit hours 3 hr lectures, exams, weekly homework
- Textbook:
  - Michael L. Scott, Programming Language Pragmatics (3rd edition) `http://goo.gl/Vzku5`.
  - Paul Graham, ANSI Common LISP `http://goo.gl/lDSVp`.
- Schedule : Tuesday, Thursday, 1530-1645
- Location : ESB G39
- Instructor name: Tim Menzies Ph.D. ESB 841a, tim@menzies.us. Note: use this for private messages. For most of the class traffic, use the class discussion list
- Consultation times : Tuesday, Thursday 1645 to 1745 or by appointment

Objectives

Overview of different paradigms of programming languages. Detailed studies in object-oriented, functional, and logic programming. Theoretical aspects of programming languages including basic language translation, virtual machines, abstraction mechanisms, declarations and types.

Topics

- Week 1: Overview ([1], page 2, [a], page 2)
- Week 2: Grammars ([1], page 2, [a], page 2)
- Week 3,4: Functional programming ([2], page 2, [a], page 2, [b], page 2, [c], page 2, [k], page 2)
- Week 5: Basic language translation ([1], page 2, [a], page 2, [b], page 2)
- Week 6: Virtual machines ([1], page 2, [a], page 2, [b], page 2)
- Week 7: Abstraction Mechanisms ([1], page 2, [a], page 2)
- Week 7,8,9:Object-oriented programming ([1], page 2, [a], page 2, [b], page 2, [c], page 2)
- Week 10: Declarations and Types ([1], page 2, [a], page 2)
- Week 11,12: Logic Programming (case studies with Prolog) ([a], page 2, [b], page 2, [c], page 2, [k], page 2)
- Week 13,14: special topics ([a], page 2, [k], page 2)

Note that all the case studies involve translating and executing a high-level specification, written as a variant of an attributed EBNF grammar. Hence, they all contribute to bc

ACM curriculum:

- 1 core
- 2 elective A

LCSEE computer science program objectives:

- a Be exposed to a variety of programming languages and systems, and will be proficient in programming in at least two languages.
- b Have the knowledge of the basic principles and methods of programming language translation.
- c Have knowledge of the basic principles of data structures, discrete mathematics and algorithms, and be able to apply this knowledge to problem solving in relevant application areas.
- k Be familiar with advanced concepts of several specialized computer science areas.

Expected Workload

You MUST be prepared to dedicate AT LEAST 5-8 working hours a week to this class (excluding the time spent in the classroom). A minimal prerequisite for the successful completion is good understanding of programming concepts. You should have gained these in the prerequisite class, CS 111. Familiarity with a high level programming language is assumed (as taught in CS 111). Laboratory instruction is not included in CS 310. You will be given class accounts on CS Department machines and all assignments will have to be submitted and run there. Please note that a Linux server can be accessed from any PC using a secure connection service, such as SSH (explanation to be provided in class).

Assessment

Mid-term: 10 marks Final exam: 30 marks Four projects, 15 marks each. These projects will be called 1,2,3,4. Each will have deliverables a,b,c (each worth up to 5 marks, if delivered on time, and 2.5 marks if delivered late). For projects 3,4 there will also be a deliverable "d" worth up to 5 bonus marks (10 marks in total). Students handing in "d" can score 110% in this subject. ALl students will commit their work to an on-line repository, supplied by the lecturer. Late marks: see point (3), above.

See also, below, for how to lose marks due to poor attendance or lateness.

For special consideration on the above, either:

See me at start of semester advising planned absences or provide a medical certificate indicating that the student was unable to work on their studies for a relevant period that doctor's note must NOT name the illness, but should list its duration Final marks:

- A =95; A =92; A- =90; B+ =86; B=83; B- =80; C+ =76; C=73; C- =70; D+ =66; D=63; D- =60; E+ =55; E=50; E- =45; otherwise F

sores

2 Lecture notes

2.1 What i the best programming language?

inside

See see [me90], page 6 and see [me90b], page 6.

2.2 Syntactic descriptions of languages

inside

3 Student projects

3.1 Groups

Students will work in groups of three.

1 : jlake8 rburris adolby

2 : lmazza mchicoin jdelong

3 : dparks2 jharpel jcraig6

4 : ssimons1 porsinge acline3

5 : dringer2 tmolina cmcgee1

6 : adanie11 jyaworsk kcruse1

7 : pprince mgrubb1 nbolyard

8 : jsatter5 jingram3 tmille42

9 : rmccorm8 plewis2 mcorum

10 : jvaughn1 cgutshal pkirkpat

11 : jsteve14 amorga25 agilber3

12 : ckorb rmoneype jmckowen

13 : sshanabe jbrenwal ssweene2

14 : smatchet dbenne14 cpetrosk

15 : lcorcuer alamb3 mgharee2

16 : jbyrd7 barmstr2 rgross4

17 : bokanyme nyanak kdavis10

18 : dswisher jsteele9 pshahan

19 : kphilyaw eiannell mcheeks1

20 : khebert anoore1 jcanady1

21 : thitrik ashepard mkobe

22 : jbreyer jcoope30 dwilli40

23 : swhite24 chinkle2 gchrist1

24 : ccover cmetz7 rrush4

25 : rrawling mphares2

FYI: students were assigned to groups, at random, using this script:

```
cat names |
gawk '{N[rand()]=$0}
  END {for(i in N) print N}'
```

3.2 1a

1a

3.3 1b

1b

3.4 1c

1c

4 Bibliography

4.1 A to F

stuff

4.2 G to M

stuff

Menzies90

Menzies90

4.3 N to T

stuff

4.4 U to Z

stuff