COURSE SYLLABUS: CPSC 6899 - Independent Study - Spring 2015

INSTRUCTOR INFORMATION

INSTRUCTOR: Dr. Dana Eckart
HOMEPAGE http://csc.ColumbusState.edu/eckart
EMAIL eckart_dana@columbusstate.edu
PHONE: 706.507.8190 (email preferred)
OFFICE HOURS: MW noon - 1pm & 6 - 7:30pm ; F noon - 1pm (and by email or appointment)
OFFICE LOCATION: CCT 434
COURSE LOCATION: on-line
COURSE MEETING TIME: asynchronous

COURSE INFORMATION

COURSE CRN: 24319
COURSE NUMBER: CPSC 6899
COURSE TITLE: Independent Study
CREDIT HOURS: 3-0-3
PREREQUISITES: Graduate standing
DESCRIPTION:

> Course project approved and supervised by an appropriate member of the graduate faculty. May be taken twice for credit.

COURSE TEXTBOOKS(s):

1. Design Concepts in Programming Languages by Franklyn Turbak, David Gifford, and Mark Sheldon.
2. The Definitive ANTLR 4 Reference by Terence Parr [Errata: https://pragprog.com/titles/tpantlr2/errata]

OTHER COURSE MATERIALS:

1. Language Implementation Patterns: Create Your Own Domain-Specific and General Programming Languages by Terence Parr.
2. Cool: A Portable Project for Teaching Compiler Construction by Alexander Aiken.
3. Additional materials as necessary.

LEARNING OUTCOMES

DESCRIPTION

This course builds upon the programming language concepts the student mastered in CPSC 5135 (Programming Languages) and CPSC 6129 (Advanced Programming Languages). and is designed to

give the student experience in programming language design as well as language system implementation (particularly implementing a compiler for the language that is designed). The language design created by the student will support:

1. Creating general-purpose programs;
2. Block structuring;
3. Lexical Scoping;
4. Strong static typing;
5. Type inference for primitive typed objects;
6. Dynamic object creation and garbage collection; and
7. Objects (abstract data types) and subprograms;
8. Provide a more seamless syntactic and semantic integration of objects and subprograms.

The student will design and build a compiler for the designed language, with the ultimate target being the ability to run in a Java Virtual Machine (as a result, the use of Java or a similar language may be used as an intermediate representation by the compiler). Documentation on how to program in the designed language as well as how to use the language system (e.g., compiler) will also be produced by the student.

MAJOR TOPICS

1. Design of a block structured imperative language;
2. Advanced use of compiler generation tools (e.g., ANTLR4) for compiler implementation;
3. Advanced use of symbol tables for scoping and type inference/checking of subprogram and object method invocations;
4. Semantic analysis and type inference;
5. Code generation;
6. Development of a test suite of programs to test the compiler implementation; and
7. Creation of appropriate end user (i.e., programmer) documentation.

Error processing SSI file

COURSE ASSESSMENT

The final grade for the course is based on the these weightings of the project deliverables, with the assessment of each deliverable involving oral presentation to the instructor (as deemed appropriate/necessary by the instructor). *If the instructor does not hear from the student (i.e., no updates on work progress) for three (3) or more consecutive weeks (without prior arrangements being agreed upon), then a grade of WF will be assigned for the course.*

The final course grade is a composite of the final exam and the assignments. The relative weighting of these items is:

Language Design	25%
Language Documentation	15%
Compiler Implementation	40%
Compiler Test Suite	20%

Letter grades will be assigned as follows: A [90-100%], B [80-90%), C [70-80%), D [60-70%), F [0-

60%).

ADMINISTRATIVE POLICIES AND ACADEMIC RESOURCES

CSU DISABILITY POLICY

If you have a documented disability as described by the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, Section 504, you may be eligible to receive accommodations to assist in programmatic and/or physical accessibility. We recommend that you contact the Office of Disability Services located in Schuster Student Success Center, Room 221, 706-507-8755 as soon as possible. Students taking online courses can contact the Office of Disability services at http://disability.columbusstate.edu/. The Office of Disability Services can assist you in formulating a reasonable accommodation plan and in providing support. Course requirements will not be waived but accommodations may be able to assist you to meet the requirements. Technical support may also be available to meet your specific need.

ACADEMIC INTEGRITY

Academic dishonesty includes, but is not limited to, activities such as cheating and plagiarism. It is a basis for disciplinary action. Collaboration is not permitted on assignments or exams/quizzes in this course. Any work turned in for individual credit must be entirely the work of the student submitting the work. All work must be your own. You may share ideas but submitting identical assignments (for example) will be considered cheating. You may discuss the material in the course and help one another with debugging, however, I expect any work you hand in for a grade to be your own. A simple way to avoid inadvertent plagiarism is to talk about the assignments, but don't read each other's work or write solutions together. Keep scratch paper and old versions of assignments until after the assignment has been graded and returned to you. If you have any questions about this, please see me immediately.

For assignments, access to notes, textbook, books and other publications is allowed. Stealing, giving or receiving any code, diagrams, drawings, text or designs from another person (CSU or non-CSU) is **not allowed**. Having access to another person's work on the system or giving access to your work to another person is **not allowed**. It is your responsibility to keep your work confidential.

No cheating in any form will be tolerated. The penalty for the first occurrence of academic dishonesty is a zero grade on the assignment or exam/quiz; the penalty for the second occurrence is a failing grade for the course. For exams/quizzes, access to any type of written material or discussion of any kind (except with me) is not allowed.

Please see CSU's Academic Conduct Policy for further information.

Student assistants in the Computer Center can help you with basic computer-related problems such as logging on to the network, saving your work, etc., but they are not obligated to help you with your assignments. There are several tutors in the Department of Computer Science lab (CCT 450) who can help you with the assignments. Their schedule is posted in the Computer Science department. You can always contact me during my posted office hours, by e-mail, or by appointment.

Cell phones and pagers must be turned off (or set to vibrate mode) prior to entering the classroom or lab. The use of any electronic device during an exam or quiz is prohibited. This includes cell phones,

calculators, PDAs, laptops, tablets, and recording pens. Any use of such a device during an exam or quiz will be considered a breach of academic integrity.

STUDENT COMPLAINT PROCESS

Information and resources concerning student complaints and academic appeals can be found on the Columbus State Univeristy website: http://aa.columbusstate.edu/appeals

ATTENDANCE POLICY

Although attendance is not required, it is *strongly* urged (provided the course is not an on-line course) and may be taken so as to determine your involvement in the course in order to satisfy certain Columbus State University reporting requirements. Be aware that I am less likely to help those who have not availed themselves of the class time (or in the case of on-line classes, the discussion group). Remember, you are still responsible for all the covered material, regardless of your attendance. Refer to the Attendance Policy in the CSU Catalog for more information on class attendance and withdrawal.

Warning: Failure to submit the signed non-repudiability portion of this syllabus *or* to join the Yahoo discussion group for this class (as indicated in the class notes) by *noon of the first Friday after classes have started*, will be understood by the instructor as an indication that the student is not interested in continuing in the class and may result in the student being **dropped from the class**.

Caution: In addition to the applicable portions of any textbook(s) for this class, lectures will likely include material not presented in the book. Unless otherwise noted, you are responsible to know and understand all materials covered in class (and in the discussion group), assigned from the text, or indicated on the course web site regardless of your own attendance.

GRADING POLICY

GENERAL

For your own protection, all graded material returned to you should be kept until after you have received your letter grade from the University. If you have any question about your final letter grade, you *must* present the graded material in question to the professor before any adjustment will be made. So keep these items in a safe place!

Most students find that this course requires a great deal of work. For some students, studying the recommended three (3) hours out of class for every one (1) hour in class may be sufficient, while other students may need to spend significantly more time to master the material. In either case please remember that grades are based on your ability to demonstrate your mastery of the material. In short, results, **NOT** effort, determine the grade you earn.

EXAMS

If you **must** miss a scheduled exam, then you will be allowed to take a makeup exam at an alternate time (provided you have sufficient reason for the request as determined by the Instructor). To do this you must notify and make prior arrangements with the Instructor as soon as you anticipate the need. Note, however, that the makeup exam may differ in both scope and difficulty from the exam it replaces. Be aware that non-emergency personal travel is insufficient reason to makeup a missed scheduled exam.

ASSIGNMENTS

Programming assignments will be graded not only for the extent to which the programs produce the required results, but also for programming "style". In particular, the programs should be well designed and self-documented with meaningful and informative comments and identifier names. In additional they should also make proper use of the ideas discussed in class. The grading criteria for assignments will vary somewhat between assignments, however the following are basic guidelines which will always apply to programming assingments:

1. Late programs (or any other assignments) will receive a grade of 0.
2. Programs with "compilation" errors will receive a grade of 0.
3. Programs with run-time errors will receive a grade no greater than 75.
4. Programs which run ``to completion" but give incorrect results will receive a grade no greater than 90.

A special word of caution about the deadlines for programming assignments: The assignments will generally require more time for completion than you might assume at first glance. In fact, some assignments may seem down right easy, but you will find it even easier to underestimate the time required to complete them. Since the penalty for being late is rather severe, you should begin working on each assignment as soon as it is distributed. Remember to allow time for unexpected problems and difficulties; such as minor computer (or network) downtime.

A final note regarding assignments: **PLEASE** compile and run your programs immediately before submitting them. Never make a change to the code file(s) and turn it in without compiling and running first. It is *very* easy to make last minute mistakes that introduce syntax or other errors, so checking before submitting can save you an unnecessary grade of 0.

TECHNICAL RESOURCES

HARDWARE REQUIREMENTS

GENERAL

To ensure that your hardware (and software) can support access to CougarView, check out the following link to test your system: https://d2lhelp.view.usg.edu/knowledge.do?sysparm_document_key=kb_knowledge,80d6f09a94e3a000e6eb9ad8fcab2105

COURSE SPECIFIC

If you plan on using your own hardware to support yourself in using the course specific software (see below), then it is recommended that you have a hardware system with the following *minimum* configuration:

1. CPU: core i3 or equivalent
2. RAM: 4GB (6GB preferred)
3. HDD/SSD: 32GB free disk space
4. OS: Linux (Recent release of Ubuntu, Red Hat, or similar); Windows 7/8/8.1; OS X (>= 10.8)

SOFTWARE REQUIREMENTS

GENERAL

In order to access materials generally available to CSU students regardless of the specific course in which you might be enrolled, it is expected that you have access to:

1. An office suite such as Microsoft Office or Open Office
2. Acrobat Reader
3. A web browser, such as one of the following:
    1. Google Chrome
    2. Firefox
    3. Safari
    4. Internet Explorer (Caution: IE is often problematic for D2L-CougarVIEW)
4. Browser plugins appropriate for the display of pdf files, QuickTime movie files, mp4 movie files, and others as needed. Plugins can be usually be obtained via your browser's manufacturer's website.

If you need technical support or assistance configuring your computer, you can refer to the link located in the "Support Resources" widget located on your "My Home" and your "Course Home" pages. If you cannot solve your problem after reviewing the knowledge base help pages, you can call Help Center 24x7 and talk to a Help Center agent. The number is 1-855-772-0423.

COURSE SPECIFIC

If you will be using a computer other than those in the Computer Lab (located in room 450 of the CCT building on the CSU main campus), the following describes the software you should ensure that you are able to install and operate on the computing resources that you'll be using. Don't wait until the last minute (e.g., several days before an assignment is due) before checking on these.

To complete all lessons, assignments, labs, and tests, you will need to access a computer with the following installed:

1. Operating System (need at least one):
    1. Linux (try Lubuntu)
    2. Windows 7/8.x
    3. Mac OSX [NOTE: While this should work, not all of the language systems may have specific installations for this OS platform.]
2. Web Browser (need at least one):
    1. Chrome
    2. Firefox
    3. Internet Explorer
3. Environment (recommended if using Windows):
    1. Cygwin provides a Unix-like environment on Windows, including many programming languages (e.g., C, C++, Lisp, Prolog). It's highly recommended that you install this as it will include some of the items from the next two sections below). NOTE: The full install will take a long time (e.g., 24 hours).
4. Various Programming Languages/Systems (need all of these):
    1. Java SDK
    2. ANTLR [get the complete ANTLR Java binaries jar]
5. IDE or text editor (need at least one):
    1. Eclipse is your best bet if you really need an IDE

    2. Vim for text editing is often my personal preference
    3. nano is a simpler editor than Vim.
    4. Notepad++, a free replacement for Microsoft's Notepad, may be more familiar to many.
6. Code Source Versioning (recommended):
    1. Subversion server
    2. TortoiseSVN web client

EXPECTATIONS

CLASS CONDUCT

CSU is committed to open, frank, and insightful dialogue in all of its courses. Diversity has many manifestations, including diversity of thought, opinion, and values. Students are encouraged to be respectful of that diversity and to refrain from inappropriate commentary. Should such inappropriate comments occur, I will intervene as I monitor the dialogue in the discussions. I will request that inappropriate content be removed from the discussion and will recommend university disciplinary action if deemed appropriate. Students as well as faculty should be guided by common sense and basic etiquette. The following are good guidelines to follow:

1. Never post, transmit, promote, or distribute content that is known to be illegal.
2. Never post harassing, threatening, or embarrassing comments.
3. If you disagree with someone, respond to the subject, not the person.
4. Never post content that is harmful, abusive; racially, ethnically, or religiously offensive; vulgar; sexually explicit; or otherwise potentially offensive.

INSTRUCTOR RESPONSIBILITIES

1. I will arrive on time and be prepared to give a thoughtful and well organized lecture.
2. If I must miss a class, I will arrange for a substitute to cover the scheduled material.
3. Graded work will be evaluated and returned to you in a timely fashion, usually within 3 working days.
4. Graded work will be evaluated in a uniform and consistent manner.
5. On work days, I will check my electronic mail frequently throughout the day.
6. If you come to me with a question, I will ask you questions to determine any misunderstandings you might have of the material as well as to guide you in discovering the answer for yourself. Do not expect me to *just give you* the answer to questions. If I do, you should feel cheated!
7. Do not expect this to be an easy course. *It isn't!*

STUDENT RESPONSIBILITIES

1. You will attend virtually every scheduled class meeting.
2. You will arrive on time and prepared to listen attentively, taking notes as necessary.
3. I expect you to have read over the appropriate materials and to have considered questions put to you before coming to class.
4. Graded work should be neat and turned in on time.
5. All graded work should be your own, with any questions concerning such work directed to the Professor only.
6. At least once every weekday, you should check your electronic mail and the WWW pages associated with this course.

7. When you come to me with a question, you should have made an attempt to find the answer on your own first.
8. If you have questions about the material or are having difficulty understanding it, please come by and ask me about it as soon as practical. Since the material builds on itself, later material will not make sense until you understand the previous material.
9. I expect you to work hard, keep up, and master the material covered during the semester.

Course Schedule

<table>
<tr><th>Week</th><th>Language Design</th><th>Language Documentation</th><th>Compiler Test Suite</th><th>Compiler Implementation</th></tr>
<tr><td>12 - 16 Jan</td><td rowspan="3">Draft
Due: 1 Feb
(Sunday)</td><td rowspan="4">Draft
Due: 8 Feb
(Sunday)</td><td rowspan="5">Draft
Due: 22 Feb
(Sunday)</td><td rowspan="5">Lexer/Parser
Due: 22 Feb
(Sunday)</td></tr>
<tr><td>19 - 23 Jan</td></tr>
<tr><td>26 - 30 Jan</td></tr>
<tr><td>2 - 6 Feb</td><td rowspan="3">Final
Due: 22 Feb
(Sunday)</td></tr>
<tr><td>9 - 13 Feb</td><td rowspan="3">Final
Due: 1 Mar
(Sunday)</td></tr>
<tr><td>16 - 20 Feb</td></tr>
<tr><td>23 - 27 Feb</td><td rowspan="11"></td><td rowspan="11"></td><td rowspan="3">Final
Due: 22 Mar
(Sunday)</td><td rowspan="3">Symbol Table & Semantic Analysis
Due: 29 Mar
(Sunday)</td></tr>
<tr><td>2 - 6 Mar</td></tr>
<tr><td>9 - 13 Mar</td></tr>
<tr><td>16 - 20 Mar</td><td rowspan="10"></td><td rowspan="10">Code Generation
Due: 3 May
(Sunday)</td></tr>
<tr><td>23 - 27 Mar</td></tr>
<tr><td>30 Mar - 3 Apr</td></tr>
<tr><td>6 - 10 Apr</td></tr>
<tr><td>13 - 17 Apr</td></tr>
<tr><td>20 - 24 Apr</td></tr>
<tr><td>27 Apr - 1 May</td></tr>
<tr><td>4 May - 8 May</td><td colspan="4">Final Report
Due: 8 May (Friday)</td></tr>
</table>

Non-Repudiability

Please print this syllabus, fill out the below information, and return it to me (either in hardcopy or email a

scanned copy to me at eckart_dana@columbusstate.edu) by noon on Friday of the first week of classes:

Student's name: _____
(please print)

[Optional] Where can I reach you in case it becomes necessary?

Email address that you use regularly: _____

Phone number(s): _____

Declaration: I have read, understood and agree to abide by the policies mentioned in the syllabus pertaining to the course. In particular, I agree to abide by the assignment policy/late work policy, attendance policy, academic dishonesty policy, website policy, and exam policy.

Signature: _____ Date: _____

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eckart_dana@columbusstate.edu