

**CPSC 827**  
**TRANSLATION OF PROGRAMMING LANGUAGES**  
**TuTh 11:00-12:15**  
**Spring 2012**

**Professor:** H. C. Grossman  
**Office:** 212 McAdams Hall  
**Office Hours:** TT 1:00 - 2:00 or by appointment  
**Phone:** 656-5863  
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**URL:** <http://cpsc827.cs.clemson.edu/>  
**Wait:** 15 Minutes  
**Attendance:** Mandatory

**TEXT:**

*Compilers Principles, Techniques, and Tools*, Aho, Lam, Sethi, and Ullman, Addison Wesley, 2<sup>nd</sup> edition

**COMPUTING FACILITY:**

You may choose the machine and language that you use to implement your compiler project. I will communicate with you via electronic mail. Please make sure that you either check your university e-mail or have that e-mail forwarded to an account that you do check regularly. The compiler tool that we will be using this semester resides on the school's network. No other tools may be used in the course.

**GRADING:**

|  |         |
|--|---------|
| Project (compiler and milestones) .....              | 350 pts |
| Quizzes 2, (quiz 2 will be April 12) .....           | 350 pts |
| Final (Wednesday, May 2, 2011, 3:00-5:30 p.m.) ..... | 300 pts |

You have 3 business days after a graded assignment has been returned to the class to challenge any grading of that assignment.

Several times throughout the semester I will be taking attendance quizzes. These quizzes will be worth 5 points each and will directly add into your final point total. I grade on a straight scale of 900-1000 points will be an A; 800-899 points will be a B; etc. I normally curve the class below a straight scale. To qualify for the curve and to qualify for the attendance quizzes being directly added into your final point total, you must not miss more than 1 attendance quiz.

**GOALS:**

- To construct a complete compiler from lexical analysis to code generation
- To understand the theoretical foundations of language translation

**ACROBAT® CONNECT™:**

As part of the delivery of the course materials, I will be using the Adobe Connect System. This system will allow you to attend class from a remote location that has an internet connection at the DSL or better speed. This system also allows me to record the class presentation so that you can listen to the lecture at a later time. If you plan on using this system remotely, you must have a microphone available for your computer so that you can fully participate in the class. If you do not have a microphone, I will remove you from the Connect session. If there is a problem with the live Connect session, you may call 864-986-9615 to report that problem.

## **PROJECT TEAMS:**

You may choose to complete the compiler project on your own or on a two person team. No team will have more than 2 people on it. Each team/individual will be responsible for meeting the established deadlines for the milestones of the effort. The project requirements are the same for a one or two person team. Periodically, I will invite teams to explain their project/code to me. If either one of the team members cannot explain their code, the team will be dissolved, and each team member must complete the project without the benefit of a partner. Teams may talk about the project with one another. However, if two teams hand in the same output or have the same code, then I will assume that the teams inappropriately collaborated, and the milestone will receive a graded of 0.

## **PROJECT SCHEDULE:**

There will be five demonstration phases of the project. They are:

|                          |                          |
|--------------------------|--------------------------|
| Lexical Analyzer         | February 2, 2012         |
| Parser                   | February 16, 2012        |
| Semantics (Declarations) | March 8, 2012            |
| Semantics (Execution)    | April 5, 2012            |
| Pragmatics               | 10:00 am, April 29, 2012 |

The project milestones must have an execution date on or prior to the dates above. No milestone will be graded that does not have an execution time and date on it. Any project or e-mail that has an execution date after the due date will receive a grade of 0 for that milestone.

Let me remind you that the entire project must be working to receive a grade above an "F" for the course. For the project to be declared working, you must be able to write a program in the language that your compiler accepts and have that program, at a minimum, add two numbers together and print the results correctly.

## **FINAL EXEMPTION:**

The final project will be composed of a baseline and 8 extra credit options. To have any of the extra credit options count, you must successfully complete the baseline requirement. If you successfully complete 6 extra credit options, you will be offered an exemption from the final exam in the class with the grade that you have earned at that point in the class.

## **TOPICS:**

Notation, Concepts, and Theory of Languages and Grammars

Finite State Automata, Regular Languages, Regular Grammars, Lexical Analyzers

Parsing: Simple, Weak, Operator Precedence; LL(k); LR(k)

Semantics: Declarative; Execution

Register Allocation: Local and Global via Graph Coloring

Code Generation

Optimization: Folding and Constant Propagation, Common Sub-Expression Elimination, Movement of Invariant Code, Dead Code Elimination, Peephole Optimization, Cache Optimization

Live Range Analysis

## **OFFICE OF STUDENT DISABILITY SERVICES**

It is University Policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation.

## ACADEMIC INTEGRITY:

“As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a 'high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

From the Academic Integrity Policy:

- Any breach of the principles outlined in the Academic Integrity Statement is considered an act of academic dishonesty.
- Academic dishonesty is further defined as:
  - Giving, receiving, or using unauthorized aid on any academic work;
  - Plagiarism, which includes the copying of language, structure, or ideas of another and attributing the work to one's own efforts;
  - Attempts to copy, edit, or delete computer files that belong to another person or use of Computer Center account numbers that belong to another person without the permission of the file owner, account owner or file number owner;
- All academic work submitted for grading contains an implicit pledge and may contain, at the request of an instructor, an explicit pledge by the student that no unauthorized aid has been received.
- It is the responsibility of every member of the Clemson University community to enforce the Academic Integrity Policy.

When in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member shall make a formal written charge of academic dishonesty including a description of the misconduct, to the Dean of the Graduate School. At the same time, the faculty member may, but is not required to, inform each involved student privately of the nature of the alleged charge.

## SCHOOL ACADEMIC HONESTY POLICY

Since the Computer Science Division of the School of Computing is part of the University, the general academic policies on cheating and plagiarism apply within the Division. The following statements reflect the division's interpretation of university policy; **but in any case where current university policy differs from the following statements, university policy takes precedence.**

See the [School Statement](#) for additional integrity considerations.

Specifically, for this class: Publicly-available code or other material may be freely used if appropriately attributed. Each team is responsible for protecting his or her files from access by others. Work that is essentially the same and submitted without proper attribution is considered to be a violation of the academic integrity policy by all those knowingly submitting the same work, regardless of whom actually did the work, i.e. the giver is just as guilty as the receiver.