

Shaw University
College of Graduate and Professional Studies
Department of Computer Information Sciences

Course Number: CSC435-01 Fall 2008

Course Name: Programming Languages and Compilers

Credit Hours: 3

Instructor's Name: Dr. Wei Jin

Office Location and Number: Graphics Building#7

Classroom & Time:

MW 12:00pm – 1:00pm: Science Building 4th Floor Smart Lab

Tue. 11:40am – 12:35pm: Science Building Room 301

Phone Number: (919) 546-8376

E-mail Address: wjin@shawu.edu

Office Hours:

MW: 11am – 12:00pm

TuTh: 12:30pm – 3:30pm

Fri.: 11am – 1pm

Shaw University Help Desk: 919-546-8587, helpdesk@shawu.edu

COMPUTER SCIENCE PROGRAM MISSIONS, GOALS AND LEARNING OUTCOMES

Mission Statement

The mission of the Bachelor of Science in Computer Science degree Program is to provide in-depth study of the fundamentals of computer science and important current issues as well as develops students' analytical and problem-solving skills. We also attempt to instill in them the attitudes and values that will prepare them for a lifetime of continued learning and leadership. We aim to help students obtain productive employment or pursue advanced degrees in computer science and related technology fields.

Computer Science Program Goals

1. Increasing retention of Computer Science major students.
2. Graduating Computer Science students who are competent in their discipline.

Computer Science Program Learning Outcomes (PLOs)

1. **Problem Solving and Critical Thinking in Computational Practice:** Solve abstract and complex problems using software design methodology. Make informed choices among alternative solutions. The student will be able to:
 - a. Design an algorithmic solution to a problem using problem decomposition and step-wise refinement.

- b. Implement an algorithm by creating a tested and debugged programmatic solution.
 - c. Examine and analyze alternative solutions to a problem.
 - d. Develop abstract models to simulate complex systems.
 - e. Determine correctness and efficiency of a system design and implementation.
- 2. Knowledge of Advanced Computing Topics:** Demonstrate understanding of the principles and current technologies in computer architecture, operating systems, computer networks, database systems, programming languages and compilers.
- 3. Communication and Interpersonal Skills:** Use written, oral and electronic methods for effective communication. The student will be able to:
- a. Document all aspects of a system precisely and clearly.
 - b. Use written, oral, and electronic communication to convey technical information effectively.
 - c. Devise effective user interfaces.
 - d. Work cooperatively in teams and with others.
- 4. Ethical and Professional Responsibilities:** Discern and articulate the impact of technologies on society. The student will be able to:
- a. Plan for and ensure the security, privacy, and integrity of data.
 - b. Recognize the ethical, legal, and social implications of computing.
 - c. Demonstrate an understanding of the Association of Computing Machinery (ACM) Code of Professional Ethics.
 - d. Analyze the impact that computing has on the global society.
 - e. Recognize the need for continuing professional development.

TEXT

Required Textbooks: Compilers --- Principles, Techniques, and Tools by Alfred V. Aho, Ravi Sethi, and Jeffrey D. Ullman. Publisher: Addison Wesley

Supplementary Materials: Lecture notes and online exercises can be found on Blackboard under the course named “**Programming Languages and Compilers**”

Hardware Requirements: A PC with MS Windows Operating System

Software Requirements: Borland C++, Internet Explore, and Flash Player

COURSE DISCRIPTION:

Prerequisites and Corequisites: CSC202 (C++ (II)) and CSC330 (Data Structures and Algorithms)

Introduces the theory and practice of programming language translation. Topics include compiler design, lexical analysis, parsing, symbol tables, declaration and storage

management, code generation, and optimization techniques.

Course Description:

Topics:

- Comparison of interpreters and compilers
- Language translation phases (lexical analysis, parsing, code generation, optimization)
- Machine-dependent and machine-independent aspects of translation
- Application of regular expressions in lexical scanners
- Lexical analysis: Application of regular expressions in lexical scanners; hand-coded vs. automatically-generated scanners; formal definition of tokens; implementation of finite-state automata
- Syntactic analysis: Formal definition of grammars; bottom-up vs. top-down parsing; tabular vs. recursive-descent parsers; error handling; automatic generation of tabular parsers; symbol table management; the use of tools in support of the translation process
- Symbol table management
- Code generation by tree walking
- The use of tools in support of the translation process and the advantages thereof

Student Learning Outcomes (SLOs): After taking this course, students are expected to be able to

1. Compare and contrast compiled and interpreted execution models, outlining the relative merits of each.
2. Describe the phases of program translation from source code to executable code and the files produced by these phases.
3. Describe the steps and algorithms used by language translators.
4. Recognize the underlying formal models such as finite state automata, push-down automata and their connection to language definition through regular expressions and grammars.

Student Learning Outcomes (SLOs)	Assessment of Student Learning Outcomes (Assessment Tools)	Linkage to Program Learning Outcomes (PLOs)
1-4	Exams and Projects	1b, 2

Class Participation:

Class participation is required and you are expected to communicate with other students on team projects, learn how to navigate in Bb, and keep abreast of course announcement. Use the assigned college or university e-mail address as opposed to personal e-mail address. Address technical problems immediately by contacting the HELP desk (919)-546-8587 and observe course netiquette at all times, For example: Always include a subject line before making a comment because; remember without facial expressions some comments may be taken the wrong way. Be careful in wording your emails, the use of emoticons might be helpful in some cases.

Attendance and Punctuality:

Attendance and punctuality will be weighed in determining your final grade. Students are expected to attend all class discussion group work and to be on time for the class discussion group. If a student is late to class (15 minutes or more) or leaves class early (15 minutes or more) or missing class, it will have the following adverse effect on his/her grade:

- Grade lowered by one grade if 3 times absent or 6 times late (or leaving class early).
- Student will be withdrawn from the course, or take a grade of "F," if 5 or more times absent or 8 or more times late (or leaving class early).

Students absent the week before a quiz or assignment will be expected to take the quiz with the class. Students will be expected to make up any work they may have missed because of their absence or tardiness.

Grade Evaluation:

Homework Assignments	40%
Announced Quizzed and Exams	20%
Comprehensive Final Exam	30%
Attendance and Unannounced Quizzes	10%

Course Schedule (Lectures, Assignments, and Exams):

Week No.	Topics	Assignments & Exams	SLOs
0 (8/21)	Introduction		
1 (8/25)	Compiler vs. Interpretation Phases of Compilation		1,2
2 (9/2)	Regular Expression	Assignment 1	4
3 (9/8)	Regular Expression → NFA → DFA	Assignment 2	3,4
4 (9/15)	Context Free Grammar and Derivation	Assignment 3	4
5 (9/22)	CFG Ambiguity and Its Removal	Assignment 3	4
6 (9/29)	Parsing (I): Top-down Parsing		3,4
7 (10/6)	Parsing (I): Top-down Parsing	Midterm Grade	3,4
8 (10/13)	Parsing (II): Bottom-up Parsing	Assignment 4	3,4
9 (10/20)	Parsing (II): Bottom-up Parsing		3,4
10 (10/27)	Parsing (II): Bottom-up Parsing	Assignment 5	3,4
11 (11/3)	LR(1) Parsing		3,4
12 (11/10)	LR(1) Parsing	Assignment 6	3,4
13 (11/17)	Flex and Yacc	Project	3,4
14 (11/24)			
15 (12/1)	Final Review		
16 (12/8)	Final Exam		

Note: Assignments are always due the Friday of the following week after it is assigned. Late submission will incur 20% penalty each week. There will be a maximum of two-week extension for each assignment.

PLAGIARIZING/CHEATING:

Plagiarizing (using another's work as your own, whether you change variable names or keep it in the original names) and cheating are serious offenses and will be treated as such. A student who plagiarizes or cheats --- whether giving or receiving information --- will receive a grade of zero on that particular exam or assignment.

LIBRARY:

It is imperative that you familiarize yourself with the instructional materials that are available to you in the James E. Cheek library on campus. Not only are there numerous books, periodicals, magazine articles, encyclopedias, and newspapers on hand for your perusal in our Library. There are course textbooks and related instructional materials that your professors have placed On Reserve for you as well. In addition, there you will have access to state-of-the-art computers and laptops, which help to place the world virtually at your fingertips. Don't wait another day.

Become a regular patron at the James E. Cheek Library here on the campus of Shaw University. You'll become a far better scholar, a more capable and well-rounded intellectual, and a sharper and more competitive individual. It's your library. Use it!

STUDENT CLASSROOM DECORUM EXPECTATIONS:

To enhance the learning atmosphere of the classroom, students are expected to dress and behave in a fashion conducive to learning in the classroom. More specifically, students will refrain from disruptive classroom behavior (**e. g., talking to classmates on cell phones, Ipods or similar electronic devices; disrespectful responses to teacher instructions; swearing; wearing clothes that distract from academic learning such as, but not limited to, wearing body-revealing clothing and excessively baggy pants; hats/caps, and/or headdress**). Students who exhibit the behaviors described above, or similar behaviors will be **immediately dismissed from class on the occurrence of the third documented offense**. The student will be readmitted to class only following a decision by the department chair. The student may appeal the decision of the department chair to the Dean of the College offering the course, and, subsequently, to the Office of the Vice President for Academic Affairs, and then to the President of Shaw University. The decision of the President will be final. Failure to follow the procedures herein outlined will result in termination of the appeal, and revert to the decision of the department chair.

Each behavior construed by the teacher/professor as not contributing to learning will be recorded, properly documented, and appropriately reported to the student and to the chair of the academic department offering the course. The report will be in written form with a copy provided to both the student and the department chair. The faculty member should retain a copy for his/her own records.

Additional student behavior codes may be found in Student Affairs especially in the Shaw University Student Handbook.

REFERENCES

- The ACM Code of Ethics (<http://www.acm.org/about/code-of-ethics>)
- The ACM/IEEE Software Engineering Code of Ethics and Professional Practice (<http://www.acm.org/serving/se/code.htm>)
- The IEEE Code of Ethics (http://www.ieee.org/portal/index.jsp?pageID=corp_level1&path=about/whatis&file=cod e.xml&xsl=generic.xsl)