

CSC 460/660: Compiler Construction

Spring 2016
Section 001

Instructor:
Phone:
Office:
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Office hours:
Class websites:

Catalogue Description

Current methods in the design and implementation of compilers. Construction of the components of an actual compiler as a term project.

Course Description

The course has two major components:

- A 6-phase programming assignment in which the student get hands-on experience with implementing a real compiler for a real language (The Espresso language is almost 100% Java 1.0 without exceptions and slightly altered imports).
- Lectures covering the theoretical aspects of compiler writing and string manipulation. A large amount of time is devoted to scanning, parsing, type checking and code generation.

Certain parts of the theoretical aspects are explained in terms of the assignment – the handout for the assignment is approximately 175 pages long.

Textbook

- "*Compilers - Principles, Techniques, and Tools*" aka 'The Dragon Book' by Aho, Sethi and Ullman. (Strongly recommended)
- "*Java Essentials for C and C++ Programmers*" by Barry Boone. (Recommended if the student does not know Java)

In addition, I am currently working on a compiler textbook myself "*Compiling Made Easy*" by Jan B. Pedersen, which I make available for the students. The PDFs is free and if they wish to obtain a printed copy they can do so at cost.

Student Outcomes Covered by This Course

CSC 460/660 covered student outcome B: *Apply design and development principles in the construction of software systems.*

This outcome was chosen as the 6-phase project/assignment is such an integral part of this course. The students get to write a real compiler for a real programming language. At the end, it is expected that they have approximately 15,000 lines of Java code.

Upon completion of the course it is expected that the successful student will

- Understand the theory behind scanning, parsing, type checking and code generation
- Be able to use existing programming tools like JFlex (a scanner generator) and Java CUP (a parser generator).
- Be able to implement all aspects of a semantic checker (name resolution, type checking, modifier checking) for a compiler for the Espresso Language.
- Be able to implement a code generator that generates code for the JVM virtual machine for the Espresso Language.

Prerequisites

To qualify for this courses the student must have earned a C or better in CSC326 (Programming Languages) and CSC456 (Automata and Formal Languages)

Grading

The following breakdown will be used in calculating the student's grade:

Programming Assignments (Espresso/Espresso+/Espresso*):			
Scanning and Parsing	5%		
Parse Trees	5%		
Name Resolution	7.5%		
Type Checking	10%		
Modifier Checking	7.5%		
Code Generation	15%	=	50%*
Midterm		=	10%**
Final Exam		=	40%**

* If a student taking CSC460 also implements Espresso+ they get another 5% per phase, and if they implement Espresso* then they get an additional 5%. This means that a CSC460 student can earn 10% extra on their assignments. A CSC660 student **must** implement Espresso+ as part of the requirement that the 6-hundred level students do more work. If a CSC660 student implements Espresso* they can earn 5% extra.

** If a student gets a better score on their final than on their midterm, the midterm will count for 0% and the final for 50%.

Course grades are calculated using this scale:

>91	A
86-90	A-
81-86	B+
76-80	B
70-75	B-
65-69	C+
60-64	C
55-63	C-
50-54	D
<50	F

It should be noted, a score of 50% is required to pass.

Furthermore, it is required that the student achieves a score of 50% on the overall score **as well as** a score of at least 50% on the written final exam to pass the course.

Academic Misconduct

Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

Department of Computer Science Academic Integrity Policy

Each student enrolled in a course offered by the Department of Computer Science is expected to do his/her own work when preparing written or programming assignments, as well as, examinations. He/She must adhere to the academic integrity policy provided by his/her instructor and the university. It is also each student's responsibility to notify the instructor if he/she becomes aware of any activities that would violate the academic integrity policy of the class.

Copyright

The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)

The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy

Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor **within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses**, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching

The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:

<https://www.unlv.edu/provost/teachingandlearning>

<https://www.unlv.edu/provost/transparency>

Incomplete Grades

The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring and Coaching

The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

UNLV Library Resources

Students may consult with a librarian on research needs. For this class, the subject librarian is Sue Wainscott.

(https://www.library.unlv.edu/contact/librarians_by_subject). UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu>.

Rebemail—By policy, faculty and staff should e-mail students' Rebemail accounts only. Rebemail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebemail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. **Emailing within WebCampus is acceptable.**

Final Examinations—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

Assessment

A 20 question assessment test covering student outcome B is given on the last day of the semester. This assessments are categorized into 'Unsatisfactory', 'Below Expectation', 'Satisfactory', and 'Exceeds expectation'. The result of the assessment test is reported in the ABET material.