Syllabus for CSE 5343: Compiler Design and Implementation
Autumn 2016
www.cse.ohio-state.edu/~rountev/5343

Instructor: Atanas (Nasko) Rountev

Course Summary
Lexical and syntax analyses using compiler generation tools; type checking; intermediate code; control-flow analysis; data-flow analysis; code optimizations; code generation; compiler projects. 3 credits.

Course Goals
• Master using tools for generation of lexical analyzers and parsers
• Master generating intermediate code
• Be competent with control-flow and data-flow analysis
• Be competent with simple code optimizations
• Be familiar with techniques for top-down and bottom-up parsing
• Be familiar with type checking
• Be familiar with generation of machine code
• Be familiar with optimizations for parallelism and locality
• Be exposed to techniques for lexical analysis
• Be exposed to register allocation

Prerequisites/Exclusions
(CSE 3901 or 3902 or 3903 or 560) and (CSE 3341 or 655); working knowledge of C++. Not open to students with credit for CSE 756.

General Information
• Class time and location: Tuesday and Thursday, 11:10 am – 12:30 pm, Dreese Labs 480
• Instructor: Atanas (Nasko) Rountev, rountev@cse.ohio-state.edu; office hours: DL 685, Tuesday and Thursday 1:00 pm – 2:00 pm, or by appointment
• Grader: Dachuan Huang, huang.1023@osu.edu; office hours: Bolz 109, Thursday and Friday 2:10 pm – 3:10 pm, or by appointment

Topics
Compiler structure; Lexical analysis; Parsing; Type checking; Intermediate representations; Control-flow analysis; Data-flow analysis; Code optimizations; Generation of machine code; Parallelism and locality; Register allocation

Reading

In addition to the book, your most important reading will be the lecture notes and your own notes. Copies of all notes will be handed out in class, and will also be available on the course web page. For each topic, I will provide pointers to relevant parts of the book.
Course Web Page
http://www.cse.ohio-state.edu/~rountev/5343: the course web page will contain all notes, handouts, assignments, a detailed schedule, pointers to reading materials, etc.

Piazza Discussions
We will use Piazza for questions and discussions. Sign up at piazza.com/osu/autumn2016/cse5343. If you have a question, it is highly preferable to post it to Piazza instead of emailing me directly. If you prefer, you can post anonymously. When a question is posted and answered on Piazza, it benefits everyone.

Projects
• There will be several programming projects, which have to be submitted electronically on stdlinux by midnight on the due date. The projects must compile and run on stdlinux. Some students prefer to implement the projects on a different machine, and then port them to stdlinux. If you decide to use a different machine, it is entirely your responsibility to make the code compile and run correctly on stdlinux before the deadline. In the past many students have tried to port their code to stdlinux too close to the deadline, leading to last-minute problems and missed deadlines.
• Projects should be done independently. General high-level discussion of projects with other students in the class is allowed, but you have to do all design, programming, testing, and debugging independently. Projects that show excessive similarities will be taken as evidence of cheating and dealt with accordingly.
• The projects are due by 11:59 pm on the due day. No exceptions will be made to this deadline: if you submit at 12:00 am, your submission will be considered to be late. Please plan your time carefully and do not submit in the last minute. The time stamp on the electronic submission will be used to determine the submission time. A reduction of 10% per day will be applied to late submissions. Submissions more than three days late will not be accepted.

Exams
• There will be two 50-minute quizzes, in-class, closed book.
• You can use a cheat sheet — one letter-size piece of paper, with notes on both sides.
• Missing a quiz without prior written (e-mail) approval from me will result in a score of zero for that quiz. To get my approval to reschedule, e-mail me at least one week before the quiz is scheduled. I will not give such approval unless the reasons are justifiable.

Grading
Projects: 80%; Quiz 1: 10%; Quiz 2: 10%

Grading Policy
The entire course will be graded on a curve. I expect the median grade to be around B+. Statistics will be provided to help you understand your standing in the class. I will grade the midterm and the final. The grader will grade the assignments and the programming projects. The person who graded something will be responsible for handling grading disputes. A grade become final one week after being handed back. This should leave plenty of time to resolve grading disputes.

If there are unforeseen emergencies that affect the planned grading scheme, appropriate adjustments will be made. I will provide as much advance notification of such changes as possible under the circumstances.

Academic Integrity
I will treat you as professionals, and you should conduct yourselves as such. You are free to discuss the projects with others. However, the solutions you submit should be developed entirely by yourself. Cheating is a very serious offense and will not be tolerated. Supplying others with materials is also against this rule. Additional details on academic integrity are available at oaa.osu.edu/coamresources.html. Please read this information carefully.
Students with Disabilities

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss his or her specific needs. Please contact the Office of Disability Services at (614) 292-3307, or visit 098 Baker Hall, to coordinate reasonable accommodations for students with documented disabilities.

BS CSE Program Outcomes

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<tr>
<th>Course Contribution</th>
<th>Program Outcome</th>
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<tr>
<td>***</td>
<td>a an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;</td>
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<td>**</td>
<td>b an ability to design and conduct experiments, as well as to analyze and interpret data;</td>
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<td>***</td>
<td>c an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;</td>
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<td>***</td>
<td>d an ability to function on multi-disciplinary teams;</td>
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<td>***</td>
<td>e an ability to identify, formulate, and solve engineering problems;</td>
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<td>**</td>
<td>f an understanding of professional, ethical, legal, security and social issues and responsibilities;</td>
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<td>g an ability to communicate effectively with a range of audiences;</td>
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<td>**</td>
<td>h an ability to analyze the local and global impact of computing on individuals, organizations, and society;</td>
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<td>***</td>
<td>i a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;</td>
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<td>j a knowledge of contemporary issues;</td>
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<td>***</td>
<td>k an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;</td>
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<td>l an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;</td>
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<td>***</td>
<td>m an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;</td>
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<td>***</td>
<td>n an ability to apply design and development principles in the construction of software systems of varying complexity.</td>
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Official Syllabus

The official syllabus for CSE 5343 is available at


The details of the syllabus for our course differ slightly from the official syllabus but the concepts to be investigated are the same as in the official syllabus.