Syllabus

EECS665 - Compiler Construction
2024, Fall

Course Personnel

Instructor Drew Davidson – `drewdavidson@ku.edu`
GTA Andrew Riachi– `ariachi@ku.edu`
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Resources

- Class Website: website
- Piazza: https://piazza.com/class/lzr4u2xfe4r71t
- Book: None Required

Prerequisites

EECS 368, EECS 448, and EECS 510 are required prerequisites. This class requires skill in applied *and* theoretical aspects of computer science. You should be comfortable with Linux and C++ programming.

Course Material Policy

Students are expected to master all material (unless otherwise stated) that is presented in class lectures and in lab. Any such material is fair game for exams, projects, etc.

Availability Policy

Email: All course-related email to instructors should be sent to the email addresses listed above. Students are expected to read course emails within 24 hours. Course emails will be sent to students' official `@ku.edu` email address and/or the address registered to Canvas.
Piazza: This course uses Piazza for course Q&A. Students are expected to join the course Piazza group. Students may not post code for assignments on Piazza. Anonymous posting is allowed, but may be revoked at the instructor's discretion.
Office Hours: Office hours will be posted on the course website. Walk-in office hours are subject to cancellation and re-scheduling. Students may make appointments for office hours and are expected to do so if the listed times present conflicts.

Course Goals

Students should be capable of:

- Understanding role/structure/phases of a compiler
- Constructing unambiguous programming language grammars
- Generating a lexer and parser using automatic tools
- Constructing machines to recognize languages
- Generating intermediate code from source code
- Type checking and static analysis
- Assembly/binary code generation

Course Topics

The following is a tentative schedule of course topics:

Topic	**# Lectures**
Scanning / lexical analysis	2
Syntactic definition	2
Syntax-directed translation	2
Parsing	6
Semantic analysis / typechecking	3
Intermediate code	2
Dataflow analysis	2
Programming language design	2
Execution environments	2
Architecture	4
Optimization	2
Machine code generation	3
Linking and loading	1
Compiler toolchains	1
Compiler techniques beyond compilers	2

Topics may be added or dropped as time permits. If the instructor feels a topic has not been covered sufficiently, students will be notified 24 hours before any assessment regarding the material that they are not responsible for knowing it. Classes may be taught by a substitute or canceled as per School of Engineering Guidelines.

Letter Grades

Letter grades are based on a total of 1000 points in the class. Individual assignments are not weighted. Students will have the opportunity to earn at least 1000 points. Bonus points may be granted automatically to all students and opportunities for more bonus points may be made available during the semester.

Letter grades will be assigned according to the table at right. Course grades may be curved at the instructor's discretion. Curves will not lower a student's letter grade, but may raise it. Curves will be applied universally to all students.

Points	Grade
[900 - 1000+	A
[800 - 900)	B
[700 - 800)	C
[600 - 700)	D
[0 - 600)	F

Coursework

Students will be assessed primarily using programming assignments (projects), written problem sets (written work), short, non-cumulative, written, in-class exams (quizzes), and a cumulative final exam (final). A small number of points will be awarded based on student effort and activities related to the class (check-ins), and tasks associated with the lab section (lab work). Points will be divided among these categories as follows:

- **Survey** given at the beginning of the semester — 2 points
- **Check-ins** 37 of 2 points each — 74 points
- **Lab work** 14 of 6 points each — 84 points
- **Written work** 10 of 4 points each — 40 points
- **Projects** 8 of 50 points each — 400 points
- **Quizzes** 4 of 50 points each — 200 points
- **Final** exam given at end of the semester — 200 points

Extra credit may be assigned for out-of-class activities or bonus work. Optional work may be assigned for no credit.

Exams (Quizzes and Final)

Quizzes are conducted during the lecture time in lieu of a midterm examination and are non-cumulative. The final is conducted at the university-assigned time and is cumulative. Students are allowed a single double-sided sheet of letter-size paper for notes per quiz, collected and kept at the end of the quiz. Students are allowed two double-sided sheets of letter-size paper for the final.

Survey

A short survey will be due at 11:59 PM on the first day of lecture. This survey facilitiates logistical aspects of the course, and the awarded grade is based on completion. Students who do not complete the survey by the due date will be asked to complete it for no credit. Any additional surveys conducted over the semester will be anonymous and not for credit, though student participation is greatly appreciated.

Check-ins

Check-ins are short review prompts attached to lectures. Check-ins are designed to be attempted before a given lecture. If a student attends that lecture, the solution will be given in-class and that student will automatically be awarded full credit. Should a student be unable or unwilling to attend a check-in's corresponding class, that student may be given a replacement assignment to complete on their own and submitted to Canvas by 11:59 on the following Sunday.

Lab work

A lab work assignment corresponds to implementation work. One lab work assignment will be provided per week. A video lecture and assignment prompt set will be provided before the beginning of lab.

Written work

One written assignment will be due on Canvas at 3:00 (immediately before lecture), on the Wednesday of each of the first 13 weeks of class. Submissions may be typeset or hand written. A scan or photograph of a handwritten assignments is acceptable, but may be awarded a zero or a re-submission requested if it is not legible. Written work must be completed individually.

Projects

Projects comprise the bulk of the coding work of the course and cover the implementation of a compiler.

- Submitted to Canvas
- Accepted up to 48 late according to the penalty system below
- May be completed alone or with 1 partner. Students are free to change or abandon partnerships between projects.

Project Penalties: Projects may be submitted up to 24 hours late for a penalty (15% off). Projects may be submitted up to 48 hours late for 2 penalties (30% off).
Penalty Tokens: Students are granted 6 "penalty tokens" for the entire semester. Each penalty token forgives a single project penalty, but does not further extend the deadline. Tokens are automatically applied to late projects to maximize student points.

Regrade Policy

Regrade requests must be made within 72 hours of grading. Course staff reserve the right to fully re-evaluate an assignment during a re-grade, potentially resulting in a lower grade than originally assigned.

Final Exam Opt-out ("Dragon Trials")

Students may optionally choose to pursue a series of extra assignments, called "dragon trials", that will collectively be used as a substitute score in place of the final exam (subject to the rules described below). The maximum score that a student may collectively earn on the dragon trials is 180 points, as opposed to the maximum value of 200 points that can be earned on the final exam.

Applying points from the Dragon Trials

As noted above, the maximum score that a student may receive on the dragon trials is 180 points. At least 6 trials will be offered throughout the semester, each worth 30 points. If more trials are offered, only the top 6 trials are used to calculate the final exam substitute score.

If a student takes the final exam and also attempts the dragon trials, the higher of the two scores will be used as part of the student's grade. The lower of the two scores will be discarded and will not count towards the student's grade.

Rationale

The dragon trials are designed to offer an additional challenge to those who find the mainline coursework to be undemanding. As such, the dragon trials may be significantly more difficult than the mandatory course assignments and require extra initiative to complete. The instructor's expectation is that not all students will be able to complete the dragon trials. Furthermore, not all students who do complete the dragon trials will benefit from the mechanism and may ultimately need to take the final exam in order to earn their desired grade. Indeed, since the maximum substitution score earns 90% of the final exam maximum (180/200), it is mathematically impossible for a student to improve their grade to an A from a lower score using the dragon trials. Students are reminded that points earned through the dragon trials are purely optional and simply offer a mechanism by which a more challenging assessment is used for students who do not wish to take the final exam.

Collaboration Policy

Using someone else's work or allowing access to work in violation of the collaboration policy is academic misconduct and will be dealt with in accordance to the University Academic Misconduct procedures. Note that sharing code or answers to assigned work constitutes a violation of the policy. Making code or answers publicly available is considered sharing (e.g., posting publicly on GitHub).

Violations of the academic misconduct policy may be initiated and pursued even after the completion of the course with the intent to remove the student's grade or status from the University.

If you are not sure if something violates the collaboration policy, please ask the instructor. Ignorance of what constitutes a violation of the policy is not a defense; it is your responsibility to be sure.

Disruptive Behavior

As a courtesy to the instructor and class, students should make special effort to show respect towards everyone during lectures, labs, and in online communication. While the instructor encourages a relaxed and friendly atmosphere, anyone causing disruptions may be asked to leave. Students should note that class disruption is considered academic misconduct under KU policy and may be dealt with accordingly.

Video Recording

The instructor may take video or audio recordings of lectures. Students who do not want to be recorded should speak to the instructor. Note that video materials created in this class are subject to the intellectual property policy detailed below. These materials are for personal use only and should not be distributed beyond the class.

Accommodation

`http://disability.ku.edu/syllabus-statement-0`
Academic Achievement and Access Center (AAAC) coordinates academic accommodations and services for all eligible KU students with disabilities. If you have a disability for which you wish to request accommodations and have not contacted the AAAC, please do so as soon as possible.They are located in 22 Strong Hall and can be reached at 785-864-4064 (V/TTY); Information about their services can be found at http://www.disability.ku.edu. Please contact me (us) privately in regard to your needs in this course.

Nondiscrimination

`http://ioa.ku.edu/ku-non-discrimination-policy`
The University of Kansas prohibits discrimination on the basis of race, color, ethnicity, religion, sex, national origin, age, ancestry, disability, status as a veteran, sexual orientation, marital status, parental status, retaliation, gender identity, gender expression and genetic information in the University's programs and activities. Please contact the University's Title IX Coordinator at `IOA@ku.edu` with any inquiries.

Religious Observances

Should the examination schedule for this course conflict with your mandated religious observance, please contact me at the beginning of the semester so that to schedule a make-up exam at a mutually acceptable time.
In addition, students will not be penalized for absence from regularly scheduled class activities which conflict with mandated religious observances. Students are responsible for initiating discussion with the instructor to reach a mutually acceptable solution.

Policy on test taking, student responsibility and religious observance:
`http://policy.ku.edu/governance/USRR#art1sect4`

Policy on attendance evaluation and mandated religious observance:
`http://policy.ku.edu/governance/USRR#art2sect1`

Academic Misconduct

Students should review the university policy on Academic conduct at:
`http://policy.ku.edu/governance/USRR#art2sect6`

Intellectual Property

`http://policy.ku.edu/provost/intellectual-property-policy`
Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor are prohibited. Unless explicit permission is obtained from the instructor, recordings of lectures and review sessions may not be modified and must not be transferred or transmitted to any other person, whether or not that individual is enrolled in the course.
Pursuant to the University of Kansas Policy on Commercial Note-Taking Ventures, commercial note-taking is not permitted in EECS 665. Lecture notes and course materials may be taken for personal use, for the purpose of mastering the course material, and may not be sold to any person or entity in any form. Any student engaged in or contributing to the commercial exchange of notes or course materials will be subject to discipline, including academic misconduct charges, in accordance with University policy. Please note: note-taking provided by a student volunteer for a student with a disability, as a reasonable accommodation under the ADA, is not the same as commercial note-taking and is not covered under this policy.