EECS 662: Programming Languages
Spring 2020

Instructor: J. Garrett Morris
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Lectures: TH 1:00-2:15 PM, Learned 1136
Office hours: TH 2:20–4:00, *and by appointment*, Eaton 2028
Course website: https://ittc.ku.edu/~garrett/eecs662s20/
      https://piazza.com/ku/spring2020/eecs662

Description.   This class is an introduction to the analysis, description, and interpretation of programming languages. We will ask questions like "What is a programming language?", "What distinguishes different programming languages?", and "What tools can we use to characterize languages?" To answer these questions, we will develop a vocabulary for discussing what languages (and programs written in them) *do*, and what they *mean*. This vocabulary will include ideas about: data representation and types; functions, evaluation, and binding; recursion and computational effects; and genericity and modularity. Our primary means of exploring these ideas will be to build interpreters for concrete languages that demonstrate them. However, keep in mind: our goal is not to write interpreters, but rather to use them as formal artifacts to gain understanding of the languages they interpret.

Recommended reading.   Your primary resource for this course will be the materials presented in lecture. Summary notes will be posted to the course webpage:

- http://ittc.ku.edu/~garrett/eecs662s20

The material in the course is most directly drawn from

- Benjamin C. Pierce, *Types and Programming Languages*, MIT Press, 2002.

However, our course will cover significantly less material than Pierce does, and our implementation will be done in a different programming language. This course is inspired by a similar course taught at Brown, as adapted to Haskell at KU:

- Shriram Krishnamurthi, *Programming Languages: Applications and Interpretation*, http://cs.brown.edu/courses/cs173/2012/book/

- Perry Alexander, *Programming Languages in Haskell*, http://ku-sldg.github.io/plih/

You may find these notes helpful as an alternate view of some of the topics we cover. However, there are important differences between this course and those. In particular, you may want to be careful adopting Haskell techniques that we do not cover.

The assignments and lectures will by done in the programming language Haskell. There are numerous resources on Haskell programming. One online text you might find helpful:

- Miran Lipovaca, *Learn You a Haskell for Great Good*, http://learnyouahaskell.com/chapters

Several Haskell textbooks are available at the KU libraries:

- Richard Bird, *Thinking Functionally with Haskell*, Cambridge University Press

- Graham Hutton, *Programming in Haskell*, Cambridge University Press

However, none of the assignments will require advanced experience with Haskell; simple pattern matching and recursion should do. The 0th homework assignment will give you an opportunity to calibrate your familiarity with Haskell programming against my expectations.

Homework. There will be five homework projects in the course: one introductory assignment, and four projects covering the material of the course. Each homework assignment will contain both regular and challenge problems. The regular problems are intended to review the material presented in lecture. The challenge problems are intended to further develop your understanding of the course material and your skill as a (functional) programmer. Completing the challenge problems is not necessary to pass the course, or even to receive an A in the course, although accomplishing the latter is unlikely.

All homework will be done in Haskell; the GHCi interpreter is available on the EECS lab machines, and available for download for major platforms from http://www.haskell.org/platform/, and for a whole bunch more from http://www.haskell.org/ghc/. I am happy to answer most questions about installing and using the Haskell platform; *however, I cannot answer questions about using the `stack` tool or its ecosystem.*

Homework should be submitted electronically on Blackboard; please submit a single file (`.zip` or `.tar`) for each assignment. Attempts to give me printouts of source code will do you no good whatsoever.

Extensions are unlikely, and will be announced in class and on the course web page should they occur. You may turn in assignments up to three days late *cumulatively* across the semester. That is, if you turn in the first assignment 2 days late, you may turn in one of the subsequent assignments one day late. The final assignment will be due the final day of class, and so *cannot* be turned in late. If you have any questions, please contact me *before* planning to miss an assignment deadline. Late assignments past this allowance will *not* be accepted.

Exams. There will be two exams, one in class on Tuesday, March 24th, and one in the university-assigned finals slot from 1:30–4:00 PM on Monday, May 11th. Exams will be held in the regular class room, and are closed book and closed notes.

Grading. Grades will be assessed as follows. *This course will not use +/- grading in Spring 2020.*

Homework	50%		A	85–100%
Regular problems	30%		B	70–84%
Challenge problems	20%		C	55–69%
Exams	60%		D	45–54%
Midterm	25%		F	0–44%
Final	30%			
Quizzes	5%			

It is possible to receive an A in the course without attempting any of the challenge problems. However, it is somewhat unlikely that you will be able to do so. If you want an A, therefore, you should tackle at least some of the challenge problems.

There is a small extra-credit cushion built into the challenge problems. There will not be other opportunities for extra credit.

Evaluating academic work is a necessarily imprecise discipline. I will adjust the thresholds down if I think that they are not accurately reflecting student accomplishment; I will not adjust thresholds up. *You must receive a passing grade on the exams to pass the course.*

Honesty and academic misconduct.   The work you submit in this course should be yours, and yours alone. You are encouraged to discuss course materials, including homework problems, with the other students in the class. However, you should only submit work that is entirely yours, and has not been derived from other sources or been shared with other students. Submitting work that is not yours is academic misconduct, and will result in receiving a score of 0 on the assignment or exam, and being reported to the chair of the department. You should be aware of the university's academic misconduct policies: http://policy.ku.edu/governance/USRR#art2sect6.

There is an ever escalating arms race between the makers of automated systems for detecting cheating and the efforts of some students to get around them. I suggest that at this point it is probably easier to get passing grades honestly than dishonestly.

Accommodation procedure.   The 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.access.ku.edu. Please contact me privately in regard to your needs in this course.

Nondiscrimination.   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 we can 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.

Concealed Carry.   Individuals who choose to carry concealed handguns are solely responsible to do so in a safe and secure manner in strict conformity with state and federal laws and KU weapons policy. Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the constant control of the carrier.
- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position
- Must have the safety on, and have no round in the chamber.

Instructors are allowed by Kansas Board of Regents policy, to require backpacks, purses and other bags be placed at the front of the room during exams, and as such those items will not be under the constant control of the individual. Students who choose to carry a concealed handgun in a purse, backpack, or bag must review and plan each day accordingly, and are responsible for making alternate arrangements as necessary. The university does not provide appropriate secured storage for concealed handguns.

Individuals who violate the KU weapons policy may be asked to leave campus with the weapon and may face disciplinary action under the appropriate university code of conduct.

Commercial Note-taking.   Pursuant to the University of Kansas' Policy on Commercial Note-Taking Ventures, commercial note-taking is not permitted in EECS 662. 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.