Robert Utterback | COMP 325: Organization of Programing Langu... https://robertutterback.github.io/courses/comp325/f17/

COMP 325: Organization of Programing Languages, Fall 2017

*This syllabus is subject to change based on specific class needs, especially the schedule. Significant deviations will be discussed in class.*

Logistics   
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Monmouth College Services

Logistics

Class Meetings: MTWF 1:00 PM - 1:50 PM in CFSB 303   
Instructor: Robert Utterback   
 Office: CSB 342   
 Phone: 309.457.2202   
 Website: https://robertutterback.github.io   
 Email: rutterback@monmouthcollege.edu   
 Office Hours: M 9-10 AM. Tu 3-4 PM. Th 11-noon. F 10-11 AM. By appointment (see the schedule on my webpage).

Website: https://robertutterback.github.io/courses/comp325/f17/ Credits: 1 course credit   
Prerequisites: COMP 220

Content

This course is an exploration of modern programming languages through the study and implementation of interpreters for fundamental language features. By implementing small

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languages with common PL features, students expand their skill set with both practical and theoretical knowledge. To understand programming languages is to understand programming and computation as a whole. A programming language is how we describe a computational process and study of the languages themselves helps to shed light on the inner workings of a computation.

Sources

The main textbook will be:

Krishnamurthi, Shriram and Lerner, Benjamin S. and Politz, Joe Gibbs. *Programming and Programming Languages*. 2016. Available here in HTML format.

We will supplement this with:

Krishnamurthi, Shriram. *Programming Languages: Application and Interpretation*. 2012. Available here in HTML format.

Topics

This course will, for the most part, follow the text. Topics to be covered will include:

Principles of Language Design and Implementation   
Arithmetic Expressions   
Conditionals   
Functions and Procedures   
Records   
State and Mutation   
Garbage Collection   
Types   
Objects   
Parametrized Types   
Type Inference

Programming Environment

We’ll be diving in with the Pyret language that accompanies PAPL. Pyret has an in-browser development environment and so may be used on any computer with a (modern) web-browser.

http://www.pyret.org/   
Style Guide: http://cs.brown.edu/courses/cs173/2013/Pyret\_Style\_Guide.html

We might, from time to time, look at some Racket as its used in PLAI. If you need or want to update your DrRacket installation, here’s the link.

http://www.racket-lang.org   
Style Guide: http://cs.brown.edu/courses/cs017/content/docs/racket-style.pdf

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Policies

Late Assignments: In general, late assignments will *not* be accepted. Exceptions may be made only for situations beyond your control. If you feel your reason is justified, schedule a meeting with the instructor to plead your case.

Academic Dishonesty: Monmouth College’s official policy on academic dishonesty can be found here. You are responsible for reading and complying with that policy.

*In this course, any violation of the academic honesty policy will have varying*   
*consequences depending on the severity of the infraction as judged by the instructor.*

*Minimally, a violation will result in an “F” or 0 points on the assignment in question.*

*Additionally, the student’s course grade may be lowered by one letter grade. In severe cases, the student will be assigned a course grade of “F” and dismissed from the class.*

*All cases of academic dishonesty will be reported to the Associate Dean who may decide to recommend further action to the Admissions and Academic Status Committee, including suspension or dismissal. It is assumed that students will educate themselves regarding what is considered to be academic dishonesty, so excuses or claims of ignorance will not mitigate the consequences of any violations*

Collaboration: We encourage you to make use of the resources available to you – it is fine to seek help from a friend, tutor, instructor, internet, etc. However, *copying of answers and any act worthy of the label of “cheating” is never permissible*! It is   
understandable that when you work with a partner or a group that the resultant product is often extremely similar. This is acceptable but be prepared to be asked to defend your collaborations to the instructor. *You should always be able to reproduce an answer on your own, and if you cannot you likely do not really know the material*.

One way to collaborate effectively is to avoid taking careful notes during a collaboration session. Discuss the material and sketch out possible solutions on a whiteboard. When you have finished, take a break and then write up your solutions without any help from notes or pictures from the study session. This not only helps avoid violations of academic dishonesty, it also improves your retention of the material!

When assignments are meant to be done in groups, you will be directed to turn in one set of solutions per group. Otherwise, each student must turn in an assignment representing their own work.

Electronic Devices: Do not use your phone in class. Keep it on silent or leave it at home. Any computer or tablet usage should be related to the course. Other usage is rude and distracting to others.

General Expectations: In short, I expect you to be respectful of others and take responsibility for your own learning. You are here to learn, so work hard and be professional.

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Just attending class is not sufficient to truly learn the material. Read the text, use the resources available at Monmouth College, and go beyond the material.

If you miss class, you are responsible for everything covered on that day. College is, in some sense, your job. Take pride in creating quality work. Staple your assignments, label problems, and present your answers neatly and orderly.

Your job is to convince me that you have learned the material – show your work! Even if you do not know a particular answer, guide me through your thought process.

Assessment

Assignments

The course workload is as follows:

|  |  |
| --- | --- |
| **Category** | **Number of Assignments** |
| Interpreters | 5–7 |
| Homework | 2–3 |
| Paper+Presentation | 1 |
| Exams | 2 |

Workload

The weekly workload for this course will vary by student but on average should be about 11 hours per week. The follow tables provides a rough estimate of the distribution of this time over different course components for a 16 week semester.

|  |  |  |
| --- | --- | --- |
| **Category** | **Total Time** | **Time/week (hours)** |
| Lectures |  | 3 |
| Homework/Interpreters | 64 | 4 |
| Exam Study | 8 | 0.5 |
| Paper/Presentation | 24 | 1.5 |
| Reading+Unstructured Study |  | 2 |

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Grading

Your final grade is based on a weighted average of particular assignment categories. You can estimate your current grade based on your scores and these weights. You may always visit the instructor *outside of class* to discuss your current standing.

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| Robert Utterback | COMP 325: Organization of Programing Langu...  **Category** | https://robertutterback.github.io/courses/comp325/f17/  **Weight** |
| Homework | 5% |
| Interpreters | 30% |
| Paper + Presentation | 20% |
| Midterm Exam | 15% |
| Final Exam | 20% |
| Participation | 10% |

This courses uses a standard grading scale. Assignments and final grades will not be curved except in rare cases when its deemed necessary by the instructor. Percentage grades translate to letter grades as follows:

|  |  |
| --- | --- |
| **Score** | **Grade** |
| 94–100 | A |
| 90–93 | A- |
| 88–89 | B+ |
| 82–87 | B |
| 80–81 | B- |
| 78–79 | C+ |
| 72–77 | C |
| 70–71 | C- |
| 68–69 | D+ |
| 62–67 | D |
| 60–61 | D- |
| 0–59 | F |

You are always welcome to challenge a grade that you feel is unfair or calculated incorrectly. Mistakes made in your favor will never be corrected to lower your grade. Mistakes made not in your favor will be corrected. *Basically, after the initial grading your score can only go up as the result of a challenge*.

Schedule

The following calendar should give you a feel for how work is distributed throughout the semester. Assignments and events are listed in the week they are due or when they occur. *This calendar is subject to change based on the circumstances of the course*.

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| Robert Utterback | COMP 325: Organization of Programing Langu... | | https://robertutterback.github.io/courses/comp325/f17/  **Assignment** |
| **Date** | **Topic** |
| Tue 08/22 | Intro to programming | HW 1 out |
| languages | |
| Wed 08/23 | Design of Programming | Read Ritchie and McCarthy |
| Languages | |
| Fri 08/25 | | Watch Steele, Read Steele |
| Mon 08/28 | Programming language | Read Floyd and Van Roy |
| paradigms; Intro to Pyret | |
| Tue 08/29 | Intro to Pyret | Read PAPL 1-2 |
| Wed 08/30 | Lists, recursion, higher-order | HW 1 due, HW 2 out, Read PAPL 5.3-5.4, 6 |
| functions | |
| Fri 09/01 | Structured and Recursive Data | HW 2 out, Read PAPL 7-9 |
| Mon 09/04 | Functions as Data | Read PAPL 13 |
| Tue 09/05 | Parsing | Read PAPL 23 |
| Wed 09/06 | Interpretation | Read PAPL 24 |
| Fri 09/08 | | HW 2 due, Interp 1 out |
| Mon 09/11 | Conditionals | Read PAPL 25 |
|  | | |

Tue 09/12

Wed 09/13

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| Fri 09/15 | Fortran | HW 3 (Anno. Bib.) out |
| Mon 09/18 | Interpreting Functions | Read PAPL 26 |

Tue 09/19

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| Wed 09/20 | Interp 1 due |

Fri 09/22

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| Mon 09/25 | Sharing and Quality | Interp 2 out (Starter code), |
| Read PAPL 18 |
| Tue 09/26 | Programming with state | Read PAPL 20 |

Wed 09/27

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|  | Fri 09/29 | Bash |  |  |
|  | Mon 10/02 | Mutable State | Read PAPL 31 |  |
| 6 of 9 | Sat 12/09 8:00 |  | Final Exam | 8/14/18, 4:15 PM |
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| Robert Utterback | COMP 325: Organization of Programing Langu... | | | https://robertutterback.github.io/courses/comp325/f17/  **Assignment** |
| **Date** | | **Topic** |
| Tue 10/03 | Implementing Boxes (code) | |  |
|  | | | |

Wed 10/04

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| Fri 10/06 | Memory Management | Interp 2 due, Read *PLAI* 11 |
| Mon 10/09 | Automatic GC: Mark and | Interp 3 out |
| Sweep |
| Tue 10/10 | Copying Garbage Collectors | HW 3 (Anno. Bib.) due |
| (10/11–10/15) | (Fall Break) | (Fall Break) |
| Mon 10/16 | Non-Copying and Incremental |  |
| GC |
| Tue 10/17 | Generational GC |  |
| Wed 10/18 | Modern C++ Memory |  |
| Management |
| Fri 10/20 | Rust: Ownership and | Read this and this |
| Borrowing |
| Mon 10/23 | First Look at Types | Read PAPL 27 |

Tue 10/24

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| Wed 10/25 | (Mentoring Day – No class) |  |
| Fri 10/27 | Type Safety | Interp 3 due, Interp 4 out, |
| Read PAPL 28 |
| Mon 10/30 | Parametric Polymorphism | Read PAPL 29 |
| Tue 10/31 | Type Inference I: Constraint | Read PAPL 30 |
| Generation |
| Wed 11/01 | Unification |  |

Fri 11/03

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|  | Mon 11/06 | Intro to Objects | Read PAPL 32 |  |
|  | Tue 11/07 | More Object Features using |  |  |
| Desugaring |
|  | Wed 11/08 | Inheritance | Interp 4 due, Interp 5 out |  |
|  | Fri 11/10 | Types for Objects |  |  |
|  | Mon 11/13 | Union and Intersection Types |  |  |
| 7 of 9 | Sat 12/09 8:00 |  | Final Exam | 8/14/18, 4:15 PM |
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| Robert Utterback | COMP 325: Organization of Programing Langu... | | | https://robertutterback.github.io/courses/comp325/f17/  **Assignment** |
| **Date** | | **Topic** |
| Tue 11/14 | Contracts | | Read *PLAI* 16 |
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Wed 11/15

Fri 11/17

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| Mon 11/20 | Control Operations: CPS | Read PAPL 33.1-2 |
| Tue 11/21 | CPS with Desugaring | Paper Due, read PAPL 33.3 |
| (11/22–11/26) | (Thanksgiving Break) | (Thanksgiving Break) |
| Mon 11/27 | CPS in the Core |  |
| Tue 11/28 | Generators |  |
| Wed 11/29 |  | Paper Presentation |
| Fri 12/01 | Lazy argument evaluation |  |
| Mon 12/04 | Prolog | Interp 5 due |

Tue 12/05

Wed 12/06

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| Sat 12/09 8:00 AM | Final Exam |

Monmouth College Services

The Teaching and Learning Center offers FREE resources to assist Monmouth College students with their academic success. Programs include Supplemental Instruction for difficult classes, Drop-In and appointment tutoring, and individual Academic Coaching.

The TLC is here to help students excel academically. TLC services are not just for struggling students, but can assist all students to get better grades, practice stronger study skills, and manage time. The TLC is located on the 2nd floor of Poling Hall.

Disability Support Services: If you have a disability or had academic accommodations in high school or another college, you may be eligible for academic accommodations at Monmouth College under the Americans with Disabilities Act (ADA). Monmouth College is committed to equal educational access. Students with disabilities can apply for accommodations at the Teaching and Learning Center.

If you have not been diagnosed with a learning disability but believe that you would benefit from disability screening, please contact Amy Hofmeister in Counseling Services.

The instructor will be notified of students with accommodations; however, it is the student’s responsibility to activate her/his accommodations. Please meet with the instructor ASAP if this applies to you!

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